Tionscadal Soláthair Uisce
Water Supply Project

Natura Impact Statement (NIS)

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Uisce Éireann
Irish Water

Jacobs

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Acronyms and Abbreviations

Acronym	Meaning
AA	Appropriate Assessment
BGL	Below Ground Level
BPT	Break Pressure Tank
BSI	British Standards Institution
BTO	British Trust for Ornithology
BWI	BirdWatch Ireland
CC	Construction Compound
CEMP	Construction Environmental Management Plan
CFRAM	Catchment Flood Risk Assessment and Management Study
CIEEM	Chartered Institute of Ecology and Environmental Management
COSHH	Control of Substances Hazardous to Health
CCTV	Closed-Circuit Television
CIRIA	Construction Industry Research and Information Association
CJEU	Court of Justice of the European Union
DAFOR	Dominant, Abundant, Frequent, Occasional, Rare
DAHG	Department of Arts, Heritage and the Gaeltacht
DAU	Development Applications Unit
DCHG	Department of Culture, Heritage and the Gaeltacht
DEHLG	Department of the Environment, Heritage and Local Government
DHLGH	Department of Housing, Local Government and Heritage
DHPLG	Department of Housing, Planning and Local Government
GDAWRZ	Greater Dublin Area Water Resource Zone
ECoW	Ecological Clerk of Works
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
EQS	Environmental Quality Standards
ESB	Electricity Supply Board
ESBN	Electricity Supply Board Networks
EU	European Union
FCV	Flow Control Valve
FOAR	Final Options Appraisal Report
GIS	Geographic Information System
GI	Ground Investigation
GSI	Geological Survey Ireland
GWB	Groundwater Bodies
GWDTE	Groundwater Dependent Terrestrial Ecosystem
HEFS	High End Future Scenario
HLPS	High Lift Pumping Station

Acronym	Meaning
HMWB	Heavily Modified Water Body
IFI	Inland Fisheries Ireland
IMP	Intermediate Poleset
INNS	Invasive Non-Native Species
I-WEBS	Irish Wetland Bird Survey
kV	Kilovolt
LiDAR	Light Detection and Ranging
LV	Low Voltage
MEWP	Mobile Elevated Work Platform
Ml	Megalitres
Mld	Million Litres Per Day
mAOD	Metres Above Ordnance Datum
MV	Medium Voltage
NWRP	National Water Resources Plan
NBDC	National Biodiversity Data Centre
NHA	Natural Heritage Area
NIS	Natura Impact Statement
NPWS	National Parks and Wildlife Service
NRA	National Roads Authority
NSL	Noise Sensitive Location
NTU	Nephelometric Turbidity Unit
OHL	Overhead Line
OPR	Office of the Planning Regulator
OPW	Office of Public Works
OSI	Ordnance Survey of Ireland
PBR	Potential Bat Roost
PCAS	Peatlands Climate Action Scheme
PM	Particulate Matter
pNHA	proposed Natural Heritage Area
POAR	Preliminary Options Appraisal Report
PRF	Potential Roost Features
PPV	Peak Particle Velocity
PSD	Pipe Storage Depot
PWWC	Passive Wedge-Wire Cylinder
RWRP	Regional Water Resource Plans
RHAT	River Hydromorphology Assessment Technique
RWBT	Raw Water Balancing Tanks
RWI&PS	Raw Water Intake and Pumping Station
RWRM	Raw Water Rising Mains

Acronym	Meaning
SAC	Special Area of Conservation
SCADA	Supervisory Control and Data Acquisition
SEA	Strategic Environmental Assessment
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SuDS	Sustainable Urban Drainage Systems
SWMP	Surface Water Management Plan
TII	Transport Infrastructure Ireland
TPR	Termination Point Reservoir
UKTAG	United Kingdom Technical Advisory Group
uPVC	Unplasticised Polyvinyl Chloride
UV	Ultraviolet
VP	Vantage Point
VOC	Volatile Organic Compound
WFD	Water Framework Directive
WTP	Water Treatment Plant
ZoI	Zone of Influence

1. Introduction

1.1 Overview

1. Uisce Éireann is proposing to develop the Water Supply Project Eastern and Midlands Region (hereinafter referred to as the Proposed Project). The proposal is to abstract, and treat to a potable standard, water from Parteen Basin on the Lower River Shannon, and to transfer the treated water along a 1.6m diameter pipeline approximately 172km long through the Eastern and Midlands Region, ending in south County Dublin. A location plan and overview of the Proposed Project is presented in Figure 1.1 and detailed in Figure 4.2 to Figure 4.60 of the Environmental Impact Assessment Report (EIAR). A full description of the Proposed Project is provided in Section 3 of this Natura Impact Statement (NIS), but in brief it includes six infrastructure sites, three sections of pipeline (Raw Water Rising Mains (RWRMs), Treated Water Pipeline from the Water Treatment Plant (WTP) to the Break Pressure Tank (BPT), and Treated Water Pipeline from the BPT to the Termination Point Reservoir (TPR)) and 38 kilovolt (kV) Uprate Works as follows:

    - A Raw Water Intake and Pumping Station (RWI&PS) on the eastern shore of Parteen Basin in the townland of Garrynatineel, County Tipperary
    - Raw Water Rising Mains which are twin 1,500mm nominal diameter underground transfer pipelines which would carry the raw water pumped from the RWI&PS for approximately 2km to the WTP at Incha Beg, Birdhill, County Tipperary
    - A WTP in the townland of Incha Beg in County Tipperary, 2.6km north-east of the village of Birdhill
    - An approximately 37km long Treated Water Pipeline extending from the WTP site in the townland of Incha Beg in County Tipperary to a high point near Cloughjordan in County Tipperary
    - A BPT in the townland of Knockanacree in County Tipperary, north of the town of Cloughjordan
    - An approximately 133km long Treated Water Pipeline extending from the BPT in the townland of Knockanacree in County Tipperary, to the termination point at a new reservoir adjacent, and immediately west of, Peamount Hospital in County Dublin (within the administrative area of South Dublin County Council)
    - A Booster Pumping Station (BPS) in the townland of Coagh Upper in County Offaly, approximately 30km downstream from the BPT
    - A Flow Control Valve (FCV) approximately 5km west of the TPR, south of Newtown in County Kildare
    - A TPR located adjacent to the existing reservoir site at Peamount, south-west County Dublin
    - Power connections to the infrastructure sites including uprating of the existing Ardnacrusha – Birdhill 38 kV overhead line (OHL) to deliver adequate electrical power to the RWI&PS and the WTP, and providing a new connection from a sub-station at Birr to the BPS
    - Operational ancillary infrastructure at frequent intervals along the length of the pipeline including Line Valves, Air Valves, water discharge points (referred to as ‘Washouts’), access points (referred to as Manways), parking Lay-Bys for maintenance access and power connections to the Line Valves.

2. Jacobs TOBIN prepared an AA Screening Report on behalf of Uisce Éireann, submitted with the Strategic Infrastructure Development application, providing information to enable the competent authority to perform its statutory function to undertake screening for AA in respect of the Proposed Project. The findings of that report were that the possibility for the Proposed Project to have likely significant effects, either individually or in-combination with other plans or projects, on European sites (namely the Lower River Shannon Special Area of Conservation (SAC), Lisduff Fen SAC, Sharavogue Bog SAC, River Barrow and River Nore SAC, Lough Derg North-east Shore SAC, Rye Water Valley/Carton SAC, Charleville Wood SAC, River Boyne and River Blackwater SAC, River Shannon Callows SAC, Slievefelim to Silvermines Mountains Special Protection Area (SPA), Slieve Bloom Mountains SPA,

Lough Derg (Shannon) SPA, Dovegrove Callows SPA, River Little Brosna Callows SPA, River Shannon and River Fergus Estuaries SPA, Slieve Aughty Mountains SPA, River Boyne and River Blackwater SPA, Poulaphouca Reservoir SPA and the Middle Shannon Callows SPA), could not be ruled out and therefore that an AA is required.

3. Jacobs TOBIN prepared this NIS in accordance with the provisions of Part XAB of the Planning and Development Act, 2000 (as amended), providing information to enable the competent authority to perform its statutory function to undertake AA in respect of the Proposed Project. This NIS includes an examination and analysis of the best available scientific knowledge and data in the field to identify and assess the implications of the Proposed Project for any European sites in view of the conservation objectives of those sites. It considers whether there are ex-situ implications for any European sites, for example from impacts which occur via upstream pathways at a remote but connected location, or from impacts on populations of ex-situ species located outside of European sites, or from impacts on ex-situ supporting habitats. It considers whether the Proposed Project, by itself and in-combination with other plans or projects, would adversely affect the integrity of any European sites. In reaching a conclusion in this regard, consideration has been given to any mitigation measures necessary to avoid or reduce any potential adverse effects.

4. Following the implementation of the mitigation measures prescribed in Section 7 of this NIS, the Proposed Project would not, individually or in-combination with other plans or projects, adversely affect the integrity of any European sites in view of their conservation objectives, and there is no reasonable scientific doubt as to that conclusion.

Raw Water | Treated Water

LONGFORD
ROSCOMMON
WESTMEATH
MEATH
GALWAY
OFFALY
DUBLIN
KILDARE
CLARE
TIPPERARY
CARLOW
KILKENNY
LIMERICK
WEXFORD

Booster Pumping Station
Flow Control Valve
Termination Point Reservoir
Treated Water Pipeline
Break Pressure Tank
Water Treatment Plant
Raw Water Rising Mains
Raw Water Intake & Pumping Station

Note: Planning Application Boundary is for information purposes only and title will be reflected in acquisition mapping

0 25 Kilometres

Legend

- Planning Application Boundary
- Treated Water Pipeline
- Raw Water Rising Mains

Infrastructure Sites

- Raw Water Intake and Pumping Station
- Water Treatment Plant
- Break Pressure Tank
- Booster Pumping Station
- Flow Control Valve
- Termination Point Reservoir

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
F03	04/12/25	Final - Planning Application	SP	LK	SN	SW

Jacobs TOBIN

Client: Uisce Éireann Irish Water; Tionscadal Soláthair Uisce Water Supply Project

Project: Water Supply Project
Eastern and Midlands Region

Drawing Title: Figure 1.1
Overview of the Proposed Project

Drawing Status: Final - Planning Application

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1.2 Legislative Context

5. This NIS has been prepared in accordance with the provisions of Part XAB of the Planning and Development Act, 2000 (as amended); and in accordance with the requirements of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive).

6. The Birds and Habitats Directives - Council Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (the Birds Directive); and Council Directive 92 /43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive), require Ireland to establish protected sites as part of a European wide network of sites (the Natura 2000 network which are known in Ireland as European sites[1]) for habitats and species that are of international importance for conservation. European sites include SACs and SPAs. SACs are selected for habitats listed on Annex I of the Habitats Directive (including priority types which are in danger of disappearance) and species listed on Annex II. SPAs are selected for bird species (listed on Annex I of the Birds Directive), regularly occurring populations of migratory bird species (such as ducks, geese and waders), and areas of international importance for migratory birds. The specified habitats and species for which each SAC and SPA is selected correspond to the qualifying interests (in the case of SACs) or special conservation interest species (in the case of SPAs) for the sites, for which conservation objectives are developed.

7. Article 6(3) of the Habitats Directive states that:

> '*Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public*.'

8. This provision is transposed into Irish law by Part XAB of the Planning and Development Act, 2000 (as amended).

9. Section 177T(1) and (2) provides for a NIS as follows:

> '*a statement, for the purposes of Article 6 of the Habitats Directive, of the implications of a proposed development, on its own or in combination with other plans or projects, for one or more than one Natura 2000 site [European site], in view of the conservation objectives of the site or sites' and specifies that it 'shall include a report of a scientific examination of evidence and data, carried out by competent persons to identify and classify any implications for one or more than one Natura 2000 site [European site] in view of the conservation objectives of the site or sites'*.

[1] The Natura 2000 network is defined under Article 3 of the Habitats Directive (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora as a European ecological network of Special Areas of Conservation, composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II, and Special Protection Areas, classified by Member States pursuant to the Birds Directive (Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds). The aim of the Natura 2000 network is to aid the long-term survival of Europe's most valuable and threatened species and habitats. In Ireland these sites are designated as European sites - defined under the Planning Acts and/or Birds and Habitats Regulations as (a) a candidate site of Community importance, (b) a site of Community importance, (c) a candidate Special Area of Conservation, (d) a Special Area of Conservation, (e) a candidate Special Protection Area, or (f) a Special Protection Area. They are commonly referred to in Ireland as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

10. Section 177V(1) notes as follows:

> '*An appropriate assessment carried out under this Part shall include a determination by the competent authority under Article 6.3 of the Habitats Directive as to whether […] a proposed development would adversely affect the integrity of a European site and the assessment shall be carried out by the competent authority before— […] (b) consent is given for the proposed development*.'

11. The Court of Justice of the European Union (CJEU) has made a number of rulings in relation to AA, regarding when it is required, its purpose and the standards it should meet. Consideration has been given to the evolution in interpretation and application of directives and national legislation arising from jurisprudence of the European and Irish courts, in respect of the Habitats Directive.

12. Any references to legislation include any amendments thereto.

1.3 Guidance and Approach

13. This NIS has been prepared with regards to the following documents:

1.3.1 European Commission Guidance

- Assessment of Plans and Projects Significantly Affecting Natura 2000 sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (European Commission Environment Directorate-General 2001)
- Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitat's Directive 92/43/EEC (European Commission 2019)
- Guidance Document on Article 6(4) of the Habitats Directive 92/43/EEC. Clarification of the Concepts of Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence. Opinion of the European Commission (European Commission January 2007, updated 2012)
- Communication from the Commission on the Precautionary Principle (European Commission 2000)
- Nature and Biodiversity Cases – Ruling of the European Court of Justice (European Commission 2006)
- Article 6 of the Habitats Directive – Rulings of the European Court of Justice (European Commission Final Draft September 2014)
- Guidelines for the Strict Protection of Animal Species of Community Interest Under the Habitats Directive (European Commission 2021)
- Assessment of Plans and Projects in Relation to Natura 2000 Sites – Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (2021/C 437/01) (European Commission 2021)
- Guidance Document on Assessment of Plans and Projects in Relation to Natura 2000 Sites – A Summary (European Commission 2022).

1.3.2 Irish Guidance

- Applications for Approval for Local Authority Developments made to An Bord Pleanála under 177AE of the Planning and Development Act, 2000, as amended (Appropriate Assessment) – Guidelines for Local Authorities (An Bord Pleanála 2013)
- Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (Department of the Environment, Heritage and Local Government (DEHLG) 2010 revision)

- Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities. Circular NPW 1/10 & PSSP 2/10
- Appropriate Assessment Screening for Development Management – OPR Practice Note PN01 (Office of the Planning Regulator (OPR) 2021).

1.3.3 UK Guidance

- Habitat Regulations Assessment. DMRB Volume 11 Section 4 LA 115 Revision 1 Sustainability and Environment Appraisal (Highways England 2020)
- Habitats Regulations Assessment Advice Note 10: Habitats Regulations Assessment Relevant to Nationally Significant Infrastructure Projects (The Planning Inspectorate 2025).

1.3.4 Other International Guidance

- Methodological Guideline for Impact Assessment of Transportation Infrastructure Significantly Affecting Natura 2000 Sites – Guidance on the provisions of Article 6(3, 4) of the Habitats Directive (Federal Ministry of Transport, Building and Housing of the Federal Republic of Germany 2004).

14. The report has also been produced with regard to the following guidance in characterising impacts, including determining magnitude and significance of impacts, as relevant in the application of AA and European sites:
    - Guidelines for Ecological Impact Assessment in the UK and Ireland (Chartered Institute of Ecology and Environmental Management (CIEEM) 2018)
    - Environmental Guidelines Series for Planning and Construction of National Roads (National Roads Authority (NRA) 2005-2009).

2. Methodology

15. In accordance with legislative requirements and those set down in case law, this NIS includes a scientific examination of best scientific knowledge and data to identify and assess the implications of the Proposed Project on its own or in-combination with other plans or projects, for one or more than one European site, in view of the conservation objectives of the site or sites. This has involved the collection and analysis of technical and scientific information by competent persons, through a range of methods including collection of available desktop data, undertaking field surveys, as well as consultation with relevant organisations and individuals and consideration of scientific literature. This NIS has been prepared by competent experts whose competence is set out below.

2.1 Scientific and Technical Competence Relied Upon

16. The preparation of this NIS has involved collaboration from a range of experts across fields of ecology, hydrology and engineering. Many individuals have contributed to the preparation of this NIS which included collecting and assessing information from scientific literature and field surveys. This was coordinated and overseen by Ms. Laura Kennedy (TOBIN) and peer reviewed by Mr. Russell Cryer (Jacobs). Information on the background and experience of the principal contributors is set out below.

2.1.1 Russell Cryer – Senior Peer Review and Senior Ecologist

17. Russell Cryer (B.Tech (Hons) in Applied Biology) is a Senior Associate Director of Ecology with Jacobs and is a Senior Peer Reviewer for the Proposed Project. He is a Chartered Environmentalist with the Chartered Institute of Ecology and Environmental Management (CIEEM) and has over 20 years of experience of supporting infrastructure projects in ecological assessment, specialising in Appropriate Assessment, including multiple projects in Ireland over the last five years. He also provides training and mentoring in Appropriate Assessment to colleagues and clients. Before this, he spent 18 years developing land management, team/project management and stakeholder engagement skills in the nature conservation field. Russell's experience has been in the voluntary, public, and private sectors and has included infrastructure projects including reservoirs and pipelines, new nuclear build, trunk roads, electricity transmission and waste management facilities, as well as development of decision-making processes and strategic assessments in the government sector.

2.1.2 Laura Kennedy – Appropriate Assessment Coordinator and Senior Ecologist

18. Laura Kennedy is a Technical Director and Lead Ecologist with TOBIN and is a Senior Ecologist for the Proposed Project. She holds an honours degree in Zoology from University College Cork and a M.Sc. in Environmental Science from Trinity College Dublin. She is a qualified and experienced environmental consultant with sixteen years' post-graduate experience in environmental sciences and environmental consultancy in Canada and Ireland. Laura has prepared and delivered Planning and Environmental Consideration reports, Technical Data reports, Environmental Assessments, Permit Applications, and Environmental Effects Monitoring reports for renewable energy projects, pipeline projects, and mining projects in Canada and Ireland. Laura has a strong technical background as an aquatic ecologist and has extensive field experience in biological and chemical water quality assessment. She has also collected hydrology and meteorology data, conducted wildlife surveys (bird and nest surveys, amphibian surveys), and carried out fish habitat assessments which included electrofishing, minnow trapping and fish identification. Laura has also undertaken Screening Reports and Natura Impact Statements for solar farm and wind energy developments and has defended Appropriate Assessments at Oral Hearings for a waste development and a mining project.

2.1.3 Paul Murphy – Senior Aquatic Ecologist

19. Paul Murphy is the Director of EirEco Environmental Consultants and is a Senior Aquatic Biologist for the Proposed Project. Paul holds a diploma in Aquatic Biology from Galway Regional Technical College and a M.Sc. in Environmental Science from Trinity College Dublin. He is also a Chartered Environmentalist with the Society for the Environment. Paul is an approved surveyor by the National Parks and Wildlife Service for various aquatic Annex-listed species and has held numerous licences for the survey of freshwater pearl mussel (Stage 1 and Stage 2), white-clawed crayfish and lamprey. Paul is fully conversant with the Appropriate Assessment process and has undertaken Screening Reports and Natura Impact Statements for a wide variety of developments. He was contracted by the Marine Institute (2014) to undertake data management for preparation of conservation objectives for Marine SACs and SPAs to guide the AA process for aquaculture and inshore fisheries. Paul was the principal author of the Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes (NRA 2005). He has been heavily involved in the assessment of river crossings on aquatic ecology and the development of mitigation to avoid, reduce or remedy potential impacts in a variety of large bridge crossings including undertaking the ecological assessments for both the Road Bridge and the Living Bridge at the University of Limerick. Paul was also the principal author of the *Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads* (NRA 2010) and regularly undertakes surveys of invasive non-native species in terrestrial and aquatic environments.

2.1.4 Finlay Horn – Principal Hydrologist and Hydrological Model Expert

20. Finlay is a chartered water resources specialist (M.Sc., C.WEM, MCIWEM) with Jacobs, working in hydrology and water resources studies for a range of water utility clients across the United Kingdom and Ireland. He has experience and capabilities in the various stages of water resources management planning, from baseline supply forecasting and drought planning using different modelling applications, to developing supply demand balances, through to options appraisal and communicating preferred solutions in multi-stakeholder workshops. Finlay joined Jacobs with a strong educational background in water resources, holding a B.Sc. in Geography and a M.Sc. in Integrated Water Resources Management. Finlay has had a long-term secondment role with Uisce Éireann since 2016. He was the Hydrology Lead for the National Water Resources Plan – Uisce Éireann's first ever strategic water resources plan. For the National Water Resources Plan, he was responsible for the water availability assessments of all 200+ public water surface water abstraction sources across Ireland. For the Proposed Project, Finlay has been responsible for the development of a hydrological model to assess the simulated impacts of the proposed abstraction from the Parteen Basin/Lough Derg system in terms of predicted changes in lake water levels and downstream flows to the River Shannon.

2.1.5 John Dillon – Senior Hydrogeologist

21. John is an Associate Director with TOBIN, a Professional Geologist (P.Geo.) and chartered waste manager (Chartered Institution of Wastes Management) and is the Senior Hydrogeologist for the Proposed Project. He holds a degree in Environmental Science from the National University of Ireland, Galway and a M.Sc. in Environmental Engineering from the Imperial College London. John provides project management, project co-ordination and specialist contribution to hydrogeology reports for Planning Applications, Environmental Impact Assessment Reports and waste licence applications. John has over fifteen years' experience in the areas of environmental management and assessment, particularly for transmission line projects, energy projects, hydrogeological projects and water abstraction and water treatment projects. John has been involved with the project management and co-ordination of Environmental Impact Assessment Reports, waste licence/permit applications and planning applications for these sectors nationwide. John has also contributed to Screening Reports and Natura Impact Statements for wastewater treatment plants, pipeline projects, solar farm and wind energy developments and has defended Appropriate Assessments at Oral Hearings for waste management facilities and high voltage powerline projects.

2.1.6 Peter Foss – Senior Environmental Scientist and Wetland Habitat Specialist

22. Dr. Peter Foss is a consultant environmental scientist and botanist, working as a freelance consultant since 2006 and expert advisor to Wetland Surveys Ireland since 2007. He holds a B.Sc. and a Ph.D., both from University College Dublin and is a Chartered Ecologist and a full member of CIEEM. He is an expert in bog and fen ecology, conservation and management. He has over thirty years' national and international experience in peatland and environmental consultancy for both the public and private sectors. In addition to the Proposed Project, he has co-ordinated numerous specialist ecological surveys on invertebrates and invasive non-native species, and undertaken over 30 bog, fen and county wetland research and survey projects. Recent projects include the Provision of a Scientific Basis for Raised Bog Conservation in Ireland, visitor impacts on the Wild Atlantic Way Signature Discovery Points and Fen Condition Assessment at Blackditch, County Wicklow. In a joint voluntary project with Wetland Survey Ireland, he has developed the on-line Map of Irish Wetlands project to show the location and provide information on all wetlands in Ireland. As part of the Proposed Project, Peter has undertaken a series of targeted wetland surveys of habitats along the proposed route between 2016 and 2018, as well as a rare plant desktop study in 2020 and 2022.

2.2 Determining the Zone of Influence of the Proposed Project

23. The Zone of influence (ZoI) is the area within which the Proposed Project could affect the receiving environment such that it could potentially have significant effects on European sites including their qualifying interest habitats or qualifying interest/special conservation interest species, or on the achievement of their conservation objectives (as defined in CIEEM 2018). The results of both the desktop study and the suite of ecological field surveys undertaken has identified the habitats and species present along the Proposed Project. The ZoI was informed and defined by the sensitivities of each of the ecological receptors present, in conjunction with the nature and potential impacts associated with the Proposed Project. There is no set recommended distance for the ZoI of a project, and it is likely to vary according to the ecological receptors in question.

24. The mechanism for defining the ZoI is summarised as follows:

- The nature, size and location of the Proposed Project were considered (see Section 3 for a description of the Proposed Project)
- The sensitivities of the relevant ecological receptors were considered (see Section 4 for a description of the baseline ecological environment)
- The potential impact sources and pathways were identified (see Section 5 for the potential impacts associated with the Proposed Project).

25. The ZoI was determined by considering all of the above, in order to determine which European sites are within the ZoI of the Proposed Project, and therefore potentially at risk of significant effects from the Proposed Project.

26. In determining the ZoI of the Proposed Project consideration was also given to whether distant European sites fall within the ZoI of the Proposed Project for ex-situ impacts on qualifying interest/special conservation interest species, considering the species' foraging range, home range and connections between sites they use (e.g. for bats, connections between foraging, maternity, breeding and hibernation sites, or for birds, connections between breeding, roosting and feeding sites).

Table 2.1: Identified Impacts and Zone of Influence (ZoI)

Potential Impact	Zone of Influence (ZoI)	Rationale
Construction Phase Impacts		
Habitat loss	0m for direct impacts (i.e. within the Proposed Project only).	Vegetation clearance would only occur within the footprint of the Proposed Project, therefore the habitats within the footprint are the only habitats potentially at risk of direct habitat loss. Habitat loss can also result from extreme cases of habitat degradation (see below for habitat degradation ZoI).
Habitat fragmentation	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts, the ZoI is considered to be up to 5km from the Proposed Project and/or where a source-pathway-receptor exists.	Vegetation clearance would only occur within the footprint of the Proposed Project, therefore the habitats within the footprint are the only habitats potentially at risk of direct habitat fragmentation. Commuting and/or foraging corridors within the Proposed Project were considered in relation to indirect effects associated with habitat fragmentation. Habitat areas or species ranges/territories through which the Proposed Project traverses were considered. The OPR (2021) states 'the zone of influence of a proposed development [i.e. the Proposed Project] is the geographical area over which it could affect the receiving environment in a way that could have significant effects on the Qualifying Interests of a European site. This should be established on a case-by-case basis using the Source-Pathway-Receptor framework'. Thus, indirect impacts were considered where a source-pathway-receptor exists.
Habitat degradation as a result of excavation and tunnelling (dewatering)	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts, the ZoI is considered to be up to 200m from where source-pathway-receptors occur within the Proposed Project.	The 200m ZoI reflects the temporary dewatering as outlined in EIAR Chapter 10 (Soils, Geology and Hydrogeology). Following identification of potential Groundwater Dependent Terrestrial Ecosystems (GWDTEs) based on extensive mapping data, the hydrological and hydrogeological desktop study information was used to determine the likelihood of connectivity between the source and receptor. Note, if a receptor is positioned upgradient or within a different GWDTE groundwater contribution zone, or considered hydrogeologically/hydrologically disconnected from infrastructure, then there is no source-pathway-receptor.
Habitat degradation as a result of hydrological impacts	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts associated with the abstraction, the ZoI extends from Meelick Weir to the confluence of the Shannon (Limerick Dock) and the Ardnacrusha Tailrace (Section 2.2.1). For indirect impacts associated with the pipeline, the ZoI is limited to water bodies to which runoff from the Proposed Project could drain during construction and operation. Impacts could occur at significant distances downstream depending on the magnitude and duration of any pollution event.	In-stream/riparian zone works would only occur within the footprint of the Proposed Project, therefore aquatic habitats and flora within the Proposed Project are the only habitats and species potentially at risk of direct habitat degradation as a result of hydrological impacts. The potential ZoI with respect to indirect habitat degradation via hydrological pathways is defined as any water bodies hydrologically connected to and/or downstream or downgradient of the Proposed Project.
Habitat degradation as a result of hydrogeological impacts (contamination)	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts, the ZoI is considered to be up to 200m from where source-pathway-receptors occur within the Proposed Project. However, all European sites with groundwater dependent qualifying interests and a hydrogeological pathway to the Proposed Project were screened due to the potential for direct or indirect impacts via groundwater/surface water pathways. Potential for impact is based on the source-pathway-receptor model.	The 200m ZoI reflects the temporary dewatering as outlined in EIAR Chapter 10 (Soils, Geology and Hydrogeology). Following identification of potential GWDTEs based on extensive mapping data, the hydrological and hydrogeological desktop study information was used to determine the likelihood of connectivity between the source and receptor. Note, if a receptor is positioned upgradient or within a different GWDTE groundwater contribution zone, or considered hydrogeologically/hydrologically disconnected from infrastructure, then there is no source-pathway-receptor.

Potential Impact	Zone of Influence (ZoI)	Rationale
Habitat degradation as a result of air quality impacts	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts, the ZoI is considered to be up to 200m from where source-pathway-receptors occur within the Proposed Project.	Vegetation clearance would only occur within the footprint of the Proposed Project, therefore the habitats within the footprint are the only habitats potentially at risk of direct habitat degradation as a result of air quality impacts. For indirect impacts in relation to dust effects during the Construction Phase, the ZoI was limited to sensitive ecological habitats within 50m of the Proposed Project (Institute of Air Quality Management (IAQM) 2024). The ZoI with respect to impacts from air quality emissions from vehicles and heavy-duty vehicle movements was limited to sensitive receptors and relevant sensitive ecological habitats within 200m from road links, with regard to the TII PE-ENV-01106 guidance (Transport Infrastructure Ireland (TII) 2022). The Operational Phase has been scoped out of the assessment on the basis that the operation of the pipeline and the permanent infrastructure sites would not produce dust or other emissions affecting air quality.
Habitat degradation as a result of introducing or spreading INNS	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts, the ZoI is considered to be up to 50m from the Proposed Project and/or where a source-pathway-receptor exists.	Any habitats crossed by, immediately adjacent to, or downstream of the Proposed Project are potentially at risk from contaminated soil/materials. The Proposed Project could cause the spread of INNS within the Proposed Project or in the immediate vicinity (i.e. unlikely to be any greater than 50m from the Proposed Project).
Disturbance/ displacement	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts, the ZoI in relation to disturbance/displacement varies with species, type of impact, and pathway and may extend for several kilometers, where a source-pathway-receptor exists.	In relation to birds, the ZoI varies with species, type of impact and pathway. A ZoI of up to 300m from the Proposed Project is considered appropriate based on Ruddock & Whitfield (2007), Cutts *et al*. (2013), Scottish Natural Heritage (SNH) (2017) and Goodship and Furness (2022), but may increase to beyond this based on relevant factors, including conservation status, sensitivity to disturbance and species core foraging distance, e.g. core foraging distance of hen harrier (*Circus cyaneus*) is 2km, with a maximum range of 10km (SNH 2016). Hardey *et al.* (2013) state that the average hunting range for a male hen harrier during breeding season is 7.3km. The core foraging distance of whooper swan (*Cygnus cygnus*) is 5km (SNH 2016), while light-bellied brent goose (*Branta bernicla hrota)* has a range of 12km. Species-specific considerations are applied, where there is a source-pathway-receptor. The ZoI for other qualifying interest species that could be directly disturbed or displaced by the Proposed Project (otter and lesser horseshoe bat) is 0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts, given the large foraging ranges for lesser horseshoe bat (known to travel 2.5km from roost (Schofield 2008)) the ZoI of potential landscape scale impacts, such as habitat loss and severance, could extend for several kilometres from the Proposed Project but the most significant effects are likely to occur within 1km of important roost sites (e.g. maternity roosts). The ZoI for indirect disturbance for otter may extend up to 150m from the Proposed Project with regard to guidance on road construction-related disturbance of underground sites for otter from the NRA (NRA 2008b). To determine the ZoI in relation to underwater noise and vibration at the RWI&PS, modelled noise levels were interpreted with regard to the guidelines outlined in Popper *et al*. (2014) for fish in relation to continuous sounds. During the Construction Phase, the maximum estimated impact range is 520m from the RWI&PS for fish with a swim bladder. Impact ranges assume noise exposure over 12 to 48 hours. Noise from vibropiling activities (highest noise generating activity) will not occur continuously over 12 to 48 hours, and therefore the ZoI distances are considered to be conservative (EIAR Appendix A8.20: Underwater Noise Modelling Report).
Mortality risk	0m for direct impacts (i.e. within the Proposed Project only).	Construction works would only occur within the footprint of the Proposed Project, therefore species within the footprint are the only species potentially at risk of direct mortality. The ZoI is established on a case-by-case basis using the source-pathway-receptor model. Thus, impacts were considered where a source-pathway-receptor exists with European sites. Species foraging or commuting within European sites crossed by the proposed Haul Roads were also considered.

Potential Impact	Zone of Influence (ZoI)	Rationale
Operational Phase Impacts		
Hydrological Impacts	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts associated with the abstraction, the ZoI extends from Meelick Weir to the confluence of the Shannon (Limerick Dock) and the Ardnacrusha Tailrace (Section 2.2.1).	Approximately 16km upstream of Lough Derg, Meelick Weir is used to maintain minimum navigation levels between Athlone and Meelick. There is a free fall of water over Meelick Weir at medium and low flows and so changes to the water levels of Lough Derg have no influence on water levels upstream of Meelick Weir (see Section 2.2.1 for more detail). Navigation around the weir is via Victoria Lock; the Incherky_010 has its confluences with the Shannon (Lower)_030 here, upstream of sluice gates at Clonahenoge. Changes to water levels in Lough Derg have no influence on water levels upstream of the sluice gates. Thus, Meelick Weir and the sluice gates set the upper limit of the ZoI on the River Shannon system. The Old River Shannon is tidal at its confluence with the Tailrace, therefore the water level would not be impacted by changes upstream. The confluence therefore forms the lower limit of the hydrological ZoI on the Tailrace and the Old River Shannon. Potential receiving watercourse locations for Washouts along the length of the pipeline where a source-pathway-receptor exists with European sites were also considered.
Introduction or spread of INNS	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts, the ZoI is considered to be up to 50m from the Proposed Project and/or where a source-pathway-receptor exists.	Potentially any habitats crossed by, immediately adjacent to, or downstream of the Proposed Project are at risk from contaminated soil/materials.
Disturbance/ displacement	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts in relation to underwater noise and vibration at the RWI&PS, the ZoI is considered to be up to 550m from the Proposed Project and/or where a source-pathway-receptor exists.	Area within the Proposed Project footprint. To determine the ZoI in relation to underwater noise and vibration at the RWI&PS, modelled noise levels were interpreted with regard to the guidelines outlined in Popper *et al*. (2014) for fish in relation to continuous sounds. During the Operational Phase, at the maximum capacity, noise levels are predicted to return to the minimum recorded baseline level of 92.2dB at 550m from the RWI&PS, and the maximum recorded baseline level of 97.7dB at 380m from the RWI&PS. Impact ranges assume noise exposure over 12 to 48 hours. Noise from vibropiling activities (highest noise generating activity) will not occur continuously over 12 to 48 hours, and therefore the ZoI distances are considered to be conservative (EIAR Appendix A8.20: Underwater Noise Modelling Report).
Pollution risk	0m for direct impacts (i.e. within the Proposed Project only).	Area within the Proposed Project footprint.
Mortality risk	0m for direct impacts (i.e. within the Proposed Project only).	Species foraging or commuting within the Proposed Project footprint.
Collison risk	0m for direct impacts (i.e. within the Proposed Project only).	Area where the 38 kV Uprate Works crosses the Lower River Shannon.

2.2.1 Abstraction Zone of Influence

27. The proposed abstraction and the operation and management of Lough Derg, Parteen Basin and the Old River Shannon[2] are described in Section 4.1.1.

28. With regard to the proposed abstraction at the RWI&PS site, the ZoI was defined in part by the extent of the water body, with respect to the nearest points of effective hydraulic control. The Electricity Supply Board (ESB) controls water levels on Lough Derg and the movement of water at, and through, Parteen Basin are controlled using both the Ardnacrusha Generating Station and Parteen Weir. The water levels on Lough Derg are managed very carefully within what is referred to as the Normal Operating Band, which is 460mm in depth, across a wide range of flows. Water levels in Parteen Basin are managed within an upper and lower level, by ESB, using Parteen Weir as the downstream control structure for water levels in the system. During low flow conditions, the lower water level at Parteen Basin (30.0mAOD Malin), must be maintained at all times for dam safety purposes. In doing this, ESB ensures that water levels in Lough Derg are within the Normal Operating Band as the waterbodies broadly operate as a combined system in these conditions.

29. To determine the upstream ZoI for the abstraction, the extent to which such an abstraction could affect the system of lakes and watercourses entering the 'Lake' system (i.e. Lough Derg and Parteen Basin), was considered. This took into account the control regime, operated by ESB.

30. As discussed in EIAR Chapter 9 (Water), the 'upstream limit' of the abstraction ZoI is Meelick Weir, which is located on the Shannon (Lower)_030, approximately 15km upstream of Lough Derg, and approximately 50km upstream of the RWI&PS. It is operated by Waterways Ireland to maintain minimum navigation levels between Athlone and Meelick. Flow and water level at this location are determined only by conditions upstream, and not by conditions downstream. This therefore sets the upper limit of physical influence for water levels in Lough Derg, i.e. it is not physically possible for water levels in Lough Derg, in low and medium flows, to influence water levels upstream of Meelick Weir. The proposed abstraction at Parteen Basin for the Proposed Project would have no hydrological influence on the River Shannon upstream of Meelick Weir.

31. The 'downstream limit' of the abstraction ZoI is the confluence of the Shannon (Limerick Dock) and the Ardnacrusha Tailrace at Limerick Dock. The diurnal tidal influence on water levels and flows at this point mean that any change in the Tailrace flow, resulting from a change in duration of flow through Ardnacrusha Generating Station as a result of the Proposed Project abstraction, would have no hydrological influence beyond the confluence at Limerick Dock.

32. Between the upstream and downstream limits, the ZoI also considered a number of water bodies which are hydrologically connected to Lough Derg (see EIAR Chapter 9: Water).

33. It should be noted a hydrological model developed for the Proposed Project was used to assess the impact of the proposed abstraction on the water levels of Lough Derg and Parteen Basin and the pass forward flows released to the Old River Shannon. The potential impacts associated with water abstraction from Parteen Basin are discussed in detail in EIAR Chapter 9 (Water) and Appendix A9.1 Annex A (Hydrological Modelling Report) and Appendix A9.1 Annex B (Water Quality Modelling Report). The results of the modelling indicate water abstraction from Parteen Basin would not significantly change the current hydrology, water quality and geomorphology of Lough Derg and Parteen Basin.

34. The ESB will facilitate the proposed abstraction of water by the Proposed Project within its current operating practices. As part of an overall agreement with ESB, water will be diverted to the Proposed Project abstraction from the flow that would otherwise have been used for electricity generation on a continuous year-round basis. At a practical level, this will mean that ESB, in keeping the water level

[2] The Old River Shannon comprises the Shannon (Lower)_050 and the Shannon (Lower)_060 WFD watercourses.

within the Normal Operating Band on Lough Derg and within the upper and lower water level on Parteen Basin, will take account of, and respond to, the volume of water abstracted for the Proposed Project, alongside other relevant considerations such as, maintaining statutory compensation flow of 10m^3/s down the old Shannon channel, predicted rainfall, the demand for power and operating practices. ESB will maintain the water levels within the Normal Operating Band on Lough Derg and within the upper and lower water levels on Parteen Basin, as it does currently. Over longer periods there would be a generalised adjustment of the flow going to Ardnacrusha by ESB to respond to the volume of water used by the Proposed Project. However, the operation of Lough Derg, post works, will feel and look very similar to the way it currently operates, and there will not be a visible day to day difference. Thus, the study area, based on potential impacts associated with the abstraction, was contained to the RWI&PS (Section 2.3).

2.3 Study Area

35. Once identified, a receptor-specific ZoI was used to inform the study areas which were then used to inform the assessment. The buffer distances applied to the study areas relied upon the findings of the desktop study and best practice guidance, taking into consideration the ZoI of potentially significant effects on European sites and their qualifying interests/special conservation interest species (Table 2.1).

36. In some instances, the ZoI extends beyond the study area (e.g. surface water quality effects of a sufficient magnitude can extend, and affect, receptors at significant distances downstream). It should be noted, the ZoI and study areas for the Construction Phase are considered to be inclusive of the ZoI and study areas for the Operational Phase (i.e. the impacts during the Operational Phase would be similar, but to a lesser extent). The exception is the ZoI associated with the abstraction during the Operational Phase, which is considered in more detail in Section 2.2.1.

37. The study area for the ecological assessment, which was informed by the ZoI, included:

- The footprint of the Proposed Project (the Planning Application Boundary) which included the RWI&PS, WTP, BPT, BPS, FCV and TPR, Construction Compounds (CC) and Pipe Storage Depots (PSD), and a minimum 75m wide buffer around the footprint (with the exception of the 38 kV Uprate Works), that extended from Parteen Basin on the River Shannon directly south of Lough Derg in County Tipperary, through the midland counties of Offaly and Kildare, and terminating at Peamount Reservoir in County Dublin. The 75m buffer was extended up to 150m at the RWI&PS and in peat areas where piling works are proposed, as well as at watercourse crossings
- A minimum 30-metre (m) wide corridor along the length of the existing 38 kV lines and associated infrastructure
- A 15m wide corridor along the proposed access tracks to the 38 kV Uprate Works
- Any watercourse crossed by the Proposed Project, including 150m upstream and downstream of the Proposed Project where suitable habitat existed for protected aquatic fauna
- The Lower River Shannon, Parteen Basin, Lough Derg, and suitable habitats favoured by target bird species within a 1km buffer of the Proposed Project, along the route of the Treated Water Pipeline and the 38 kV Uprate Works (EIAR Appendix A8.21: Breeding Bird Surveys Summary Report and EIAR Appendix A8.22: Winter Bird Surveys Summary Report).

38. Consideration was also given to qualifying interest/special conservation interest species and habitats outside these areas on a case-by-case basis where a possible source-pathway-receptor was identified.

39. Note, the various elements of the Proposed Project are described in detail in Section 3: Description of Proposed Project.

2.4 Desktop Study

40. The sources of desktop data relied upon in the preparation of this report are listed below:

- Review of Ordnance Survey of Ireland (OSI) mapping (www.osi.ie), aerial photography (Google Maps, Bing Maps, Light Detection and Ranging (LiDAR) Mapping (from October 2016), and oblique imagery (from August 2024)) for the Proposed Project and its environs
- Online data available on European sites, including habitat and species Geographic Information System (GIS) datasets, and conservation objectives (and supporting) documents, as held by the National Parks and Wildlife Service (NPWS) (NPWS 2025a; NPWS 2025b)
- Data requests were submitted to the NPWS (data downloaded and/or received between 2016 and 2025) requesting any records of protected species or habitats, and any habitat mapping/surveys undertaken within the ZoI of the Proposed Project (Appendix A: NPWS Correspondence). The NPWS responded with data on habitats, rare and protected species, locations of freshwater pearl mussel (*Margaritifera margaritifera* and *Margaritifera durrovensis*) within the River Barrow catchment, and records of hen harrier and peregrine falcon (*Falco peregrinus*)
- Information on the status of EU protected habitats and species in Ireland (NPWS 2019a, 2019b and 2019c)
- National Biodiversity Data Centre (NBDC), records and mapping for the following 10km grid squares within and surrounding the Proposed Project: R56, R66, R67, R76, R77, R87, R88, R98, R99, S08, S09, N00, N10, N11, N21, N31, N41, N42, N52, N62, N72, N73, N83, N92, N93, O03 (NBDC 2025) (i.e. habitats and species distribution data recorded within 10km square grid references on a map)
- Environmental information/data from the Environmental Protection Agency (EPA) Online Environmental Map Viewer (EPA 2025a)
- Information and data on water catchments from the Water Action Plan 2024: A River Basin Management Plan for Ireland (Department of Housing, Local Government and Heritage (DHLGH) 2024a); the EPA's catchment data (EPA 2025b); and the Water Framework Directive (WFD) Ireland database (EPA 2025c)
- Bat Conservation Ireland (BCIreland) database of roost records, ad hoc detector records and transects surveys (BCIreland 2025).
- BirdWatch Ireland (BWI) Irish Wetland Bird Survey (I-WeBS) dataset. The I-WeBS is the primary tool for monitoring populations of non-breeding water birds and their key wetland sites in the Republic of Ireland. The data were obtained via the online webpage and via a data request, which included I-WeBS data for the winters: 2012/13 up to 2022/23 (BWI 2024)
- Inland Fisheries Ireland (IFI) data requests and consultation (see Section 2.7.2), project survey data and IFI website.

41. The hydrology baseline assessment which informed this NIS, considered the following additional sources of information:

- Environmental Data Exchange Network (EDEN) Portal (EDEN n.d.)
- EPA Water Environmental Data Maps (EPA 2025d)
- Strategic Environmental Assessment (SEA) Environmental Report for the Water Supply Project - Dublin Region (RPS 2008a)
- Office of Public Works (OPW) flow records (OPW 2024)
- Electricity Supply Board water levels on Lough Derg and Parteen Basin (data file obtained via email from ESB)
- ESB flow records through the Ardnacrusha Generating Station and over Parteen Weir (data file obtained via email from ESB).

42. The hydrogeological baseline assessment, which also informed this NIS, considered the following additional sources of information:

- Online maps and data of the Geological Survey of Ireland (GSI n.d.)
- Ground investigation (GI) data (EIAR Appendix A10.1 to EIAR Appendix A10.14 (Ground Investigations))
- EPA Geoportal Site (EPA n.d.)
- Landowner consultation on Private Water Supply (EIAR Appendix A10.15: Summary of Private Groundwater Supplies).

2.5 Baseline Surveys

43. The following sections describe the surveys that were carried out to inform this NIS. The results of these surveys are presented in Section 4 and Section 6 of this NIS, with further details provided where necessary in appendices referenced throughout.

44. The approach and scope of the ecological surveys for the NIS were developed keeping in mind the requirements of the Habitats Directive, the Birds Directive, the transposing national legislation and relevant case law, and the conservation objectives of European sites likely to be affected by the Proposed Project, as well consideration of sites that could potentially support qualifying interests/special conservation interest species. Extensive field surveys were designed and carried out over a number of years by ecologists and other experts. Early-stage surveys were undertaken for previous iterations of the project[3] with the specific intention of identifying constraints and avoiding significant effects on European sites in view of their conservation objectives.

2.5.1 Ecological Surveys

2.5.1.1 Overview of Ecological Surveys

45. The following sections provide an outline of the various ecological surveys and methodologies used to collate baseline ecological information for the Proposed Project. A summary of ecological surveys undertaken between 2016 and 2025 which informed the preparation of this NIS are listed in Table 2.2 and described in Section 2.5.1.2 to Section 2.5.1.7. Surveys undertaken for previous iterations of the project remain valid for the Proposed Project as the alignment remains the same in many instances.

46. These surveys were conducted with regard to or exceeding best practice guidance, with the exception of the survey limitations, as discussed in Section 2.5.4. It should be noted, some surveys were not required to be repeated due to the data remaining valid upon verification, or where surveys were replaced by an alternative survey type. The surveys undertaken are considered to be sufficiently robust and current to accurately inform this assessment.

47. Strict biosecurity protocols were followed during field survey work in order to reduce the potential spread of invasive non-native species (INNS), pathogens and disease. All field ecologists used 'Department of Agriculture' approved disinfectant that was also suitable for aquatic work, and a hard brush to clean footwear when moving between farms/watercourses when conducting surveys. Where there was greater risk of exposure and/or at the landowner's request, the field ecologists also wore disposable boot covers when entering farmlands. For vehicles entering farmland, the wheels were also sprayed with disinfectant

[3] 'Previous iterations of the Proposed Project' refer to the In-flight Water Supply Project developed prior to the adoption of the National Water Resources Plan and Eastern and Midlands Plan. The 'Proposed Project' refers to the project that planning permission is being sought for as described in Chapter 4 (Proposed Project Description) in the EIAR and that has taken account of the conclusions of the National Water Resources Plan and Eastern and Midlands Plan. The Proposed Project aligns with the Preferred Approach for the Eastern and Midlands Region, a New Shannon Source with transfers as set out in the Eastern and Midlands Plan (see EIAR Chapter 3: Consideration of Suitable Alternatives, for further information). Reference is made to previous iterations of the project within this NIS where design development, survey and consultation feedback is relevant to the Proposed Project.

when leaving the area. In areas where there was evidence of high levels of wildlife activity, the field ecologists took particular care in disinfecting footwear before leaving the area.

Table 2.2: Ecological Surveys and Survey Dates

Survey		Survey Date(s)	Surveyor(s)
Verification Surveys	Verification Surveys (i.e. field verification of preliminary habitat mapping and identification of potential ecological constraints)	May 2016	TOBIN
Habitat Surveys	Habitat Surveys ('Preferred Pipeline Corridor'[4] and infrastructure sites proposed at the time)	June to July 2016	TOBIN
	Parteen Basin Habitat Assessment	June 2016 October 2016 August 2020	Wetland Surveys Ireland Ltd. (Dr. Peter Foss) Dr. John Cross Wetland Surveys Ireland Ltd. (Dr. Patrick Crushell)
	Coagh Upper Fen	July 2016 August 2019	Wetland Surveys Ireland Ltd. (Dr. Peter Foss, Mr. Brendan Kirwan and Ms. Mary Catherine Gallagher)
	Targeted Wetland/Botanical Surveys	August 2016 June 2017 August 2018 August and September 2019 August 2020 September 2021 August 2022 May and June 2023 August 2024 June 2025	Wetland Surveys Ireland Ltd. Dr. John Conaghan
	Habitat Surveys	July and September 2017 (re-routes) June to August 2018 August 2019 (re-attempt 'no access' lands) July to October 2020 July to October 2021 (re-routes) June to October 2022 June 2023 (re-attempt 'no access' lands) June to October 2024 May and June 2025 (re-attempt 'no access' lands and re-routes)	TOBIN
Protected Mammal Surveys	Bat Surveys – driven transects	June 2016	TOBIN
	Bat Surveys – driven transects	May 2019	Dr. Tina Aughney (Bat Eco Services)
	Bat Surveys – walked transects and static detectors	May to September 2016 April to September 2017 April to October 2018	TOBIN

[4] A 200m wide corridor published in the Final Options Appraisal Report, located within the Least Constrained Pipeline Corridor, and within which the Proposed Project Construction Working Width (50m wide) was subsequently positioned.

Survey		Survey Date(s)	Surveyor(s)
	Bat Surveys – walked transects and static detectors	June to September 2019 July to September 2020 June to August 2021 June 2022 June to August 2024 May and June 2025	Dr. Tina Aughney (Bat Eco Services)
Protected Mammal Surveys	Bat Surveys – roost emergence/re-entry surveys	July to September 2016 April 2017 June and July 2018	TOBIN
	Bat Surveys – roost emergence/re-entry surveys	June to September 2019 July to September 2020 June to August 2021 June 2022 June to August 2024 May and June 2025	Dr. Tina Aughney (Bat Eco Services)
	Otter Surveys ('Preferred Pipeline Corridor' and infrastructure sites proposed at the time)	June to July 2016	TOBIN
	Otter Surveys at Parteen Basin	November 2016 June 2017 October 2021 September 2022 October 2024	TOBIN
	Otter Surveys at watercourse crossings	September to November 2016 July to August 2017 August 2018 September to October 2019 August to September 2020 July 2022 August and September 2024	TOBIN
	Otter Surveys	July and September 2017 (re-routes) June to August 2018 August 2019 (re-attempt 'no access' lands) July to October 2020 July to October 2021 (re-routes) June to October 2022 June 2023 (re-attempt 'no access' lands) June to October 2024 May and June 2025 (re-attempt 'no access' lands and re-routes)	TOBIN
Bird Surveys	Breeding Bird Surveys – walkover surveys, breeding water bird boat surveys, and Vantage Point (VP) surveys at infrastructure sites and within the study area of the Treated Water Pipeline	June to September 2016 May to July 2017 May to July 2018 April to September 2019 July to September 2020 April to September 2021 April to September 2022 April to June 2024	TOBIN Benson Ecology (Ms. Lorraine Benson)
	Breeding Bird Surveys – walkover surveys, VP surveys, and wader surveys within the study area of the 38 kV Uprate Works	April to September 2019 July to September 2020 April to September 2022 April to September 2024	TOBIN Benson Ecology (Ms. Lorraine Benson)

Survey		Survey Date(s)	Surveyor(s)
Bird Surveys	Wintering Bird Surveys – VP surveys at Parteen Basin and Lough Derg	October 2015 to March 2016 November 2016 to March 2017 November 2017 to April 2018 November 2018 to April 2019 October 2019 to March 2020 October 2020 to March 2021 October 2022 to March 2023 October 2023 to March 2024 October 2024 to March 2025	TOBIN Benson Ecology (Ms. Lorraine Benson)
	Wintering Bird Surveys – VP surveys within the study area of the 38 kV Uprate Works	September 2019 to March 2020 October 2020 to March 2021 October 2022 to March 2023 October 2023 to March 2024 October 2024 to March 2025	TOBIN Benson Ecology (Ms. Lorraine Benson)
	Wintering Bird Surveys – I-WeBS	October 2015 to March 2016 October 2016 to March 2017 November 2017 to April 2018 November 2018 to April 2019 October 2019 to March 2020 October 2020 to March 2021 October 2022 to March 2023 October 2023 to March 2024 October 2024 to March 2025	TOBIN Benson Ecology (Ms. Lorraine Benson)
	Wintering Bird Surveys – hen harrier winter roost surveys	October 2016 to March 2017 November 2017 to April 2018 November 2018 to April 2019 October 2019 to March 2020 November 2020 to March 2021	TOBIN
	Wintering Bird Surveys – VP surveys at infrastructure sites	October 2020 to March 2021 October 2022 to March 2023 October 2023 to March 2024 October 2024 to March 2025	TOBIN Benson Ecology (Ms. Lorraine Benson)
Aquatic and Fishery Surveys	Aquatic Ecological Surveys at watercourse crossings	September to November 2016 July to August 2017 August 2018 September to October 2019 August to September 2020 July 2022 August and September 2024 May and June 2025 (re-attempt 'no access' lands and re-routes)	TOBIN
	Fish Stock Survey at Parteen Basin and Lough Derg (National Research Survey Programme)	June and July 2016	Inland Fisheries Ireland (supported by Uisce Éireann for the Proposed Project)
	Benthic Survey at Parteen Basin	August 2016	Aquafact Environmental Consultants (Dr. Brendan O'Connor)
	Aquatic Ecological Survey at Parteen Basin (survey for Atlantic salmon, lamprey species and otter)	August 2017 August 2019 June 2021 August 2024	EirEco Environmental Consultants (Mr. Paul Murphy)
	Invasive Non-Native Aquatic Species Surveys in Lough Derg and Parteen Basin	June 2021 August 2024	EirEco Environmental Consultants (Mr. Paul Murphy) and Mr. Dan Minchin

Survey		Survey Date(s)	Surveyor(s)
	Underwater Acoustic Surveys	October 2021	Subacoustech Environmental Ltd.
Vertigo Surveys	Vertigo Surveys (suitable wetland areas along Treated Water Pipeline route and infrastructure sites)	July 2020	John Brophy (BEC Consultants Ltd.)

Note: TOBIN includes the following personnel: Roger MacNaughton, Daireann McDonnell, Andrew Torsney, Brian Arneil, Austin Cooney, Phil Budd, Jessica Quinn, Christopher Walsh, Padraig Cregg, Joanne Allen-Hamilton, Alan Booth, Kevin Delahunty, Laura Kennedy, John Sherry, Kilian Murphy, Ria Aherne, Sophia Couchman, Joao Martins, Áine Sands, Sinead O'Reilly, Sarah Nolan, Jason Cahill, Kit Lawson, Ciara Byrne, Joe Freijser, Eoghan Phelan, Jaroslaw Majkusiak and Úna Butler. All surveyors were suitably qualified and experienced to undertake the surveys.

2.5.1.2 Terrestrial Habitat Surveys

48. The development of previous iterations of the project to deliver water to Dublin from the River Shannon were the result of a design process, over an extended period, which examined the options that existed at the time to deliver a long-term sustainable water supply source, initially for the Dublin Region and latterly for the Dublin Region and an additional Benefiting Area (Jacobs TOBIN 2016; see Section 3.10). In order to inform the route selection process, terrestrial habitat surveys were carried out between June and October 2016. These included habitat mapping surveys along previous iterations of the project, as well as the RWI&PS, WTP, BPT, and TPR (i.e. associated infrastructure; note the BPS was subsequently added in 2020 and the FCV was added in 2024). The results from these surveys informed a multi-criteria analysis of the potential impacts on environmental criteria (including potential presence of Annex I habitats) and were used to identify the preferred locations for the Proposed Project and previous iterations of the project (Jacobs TOBIN 2016).

49. In order to describe, classify, and map the habitats likely to be significantly affected by the Proposed Project, habitat surveys were undertaken with regard to the Heritage Council's Best Practice Guidance for Habitat Survey and Mapping (Smith *et al.* 2011) and were classified according to The Heritage Council's A Guide to Habitats in Ireland (Fossitt 2000) and following the EU Habitats Interpretation Manual for Annex I Habitats (European Commission (EC) 2013) and NPWS Irish Wildlife Manuals (NPWS 1998-2019), where relevant. Particular focus was given to any habitats recorded that may conform to an Annex I habitat or a habitat that may support an Annex I or Annex II species.

50. According to guidelines from the NRA (2009) on ecological surveying techniques for national road schemes (linear developments like the Proposed Project and therefore considered to be relevant), habitats present within a route corridor along the entire length of a project should be classified and mapped, for it then to be possible to restrict follow-up surveys to selected habitats, features or locations. By selecting the following, the habitat surveys conducted for the Proposed Project exceeded these best practice guidelines (NRA 2009):

    - The footprint of the Proposed Project and a minimum 75m wide buffer around the footprint (with the exception of the 38 kV Uprate Works), that extended from Parteen Basin on the River Shannon directly south of Lough Derg in County Tipperary, through the midland counties of Offaly and Kildare, and terminating at Peamount Reservoir in County Dublin. The 75m buffer was extended up to 150m at the RWI&PS and in peat areas where piling works are proposed, as well as at watercourse crossings
    - A 30m wide survey buffer along the length of the existing 38 kV OHL and associated infrastructure
    - A 15m wide survey corridor along the proposed access tracks to the 38 kV Uprate Works
    - Any watercourse crossed by the Proposed Project, including 150m upstream and downstream of the watercourse crossing, where suitable habitat existed for protected aquatic fauna.

51. As previously noted, the buffer distances applied to the study areas relied upon the findings of the desktop study and best practice guidance, taking into consideration the ZoI of potentially significant effects on European sites and their qualifying interests/special conservation interest species (Table 2.1).

52. A review of LiDAR Mapping (October 2016) for previous iterations of the project, and oblique imagery (August 2024) of the Proposed Project assisted with habitat delineation and interpretation. Predominant plant species were recorded in order to determine accurately the habitats likely to be significantly affected by the Proposed Project locations. Plant identification and nomenclature principally followed Stace (2019), Parnell *et al.* (2012) and Rose (1989), unless otherwise stated. Searches for potential presence of INNS were also conducted during all habitat surveys. Records of INNS were collected including species, location, date and abundance information.

53. Habitat surveys were conducted for the Proposed Project and previous iterations of the project between 2016 and 2025 as outlined in Table 2.3, with the exception of 'no access' lands (Section 2.5.4). The specific areas surveyed in each year have been influenced by design development of the Proposed Project and availability of access for surveyors to lands within the field study area.

Table 2.3: Summary of Habitat Surveys

Locations	Survey Area	Dates of Surveys									
		May and June 2016	July and Aug 2017	June to Oct 2018	June 2019	July to Oct 2020	July to Oct 2021	June to Sep 2022	June 2023	June to October 2024	May and June 2025
RWI&PS	The footprint of the Proposed Project (i.e. the iteration at the time of surveys) and a minimum 75m wide buffer around the footprint, that extended from Parteen Basin on the River Shannon directly south of Lough Derg in County Tipperary, through the midland counties of Offaly and Kildare, and terminating at Peamount Reservoir in County Dublin.	✓	—	✓	—	✓	—	✓	—	✓	✓
WTP		✓	—	✓	—	✓	—	✓	—	✓	—
BPT		✓	—	✓	—	✓	—	✓	—	✓	✓
BPS		—	—	—	—	✓	—	✓	—	✓	—
FCV		✓	—	✓	—	✓	✓	✓	✓	✓	—
TPR		✓	—	✓	—	✓	—	✓	—	✓	—
RWRMs		✓	—	✓	—	✓	—	✓	—	✓	✓
Treated Water Pipeline from the WTP to the BPT		✓	✓ (re-routed sections)*	✓	—	✓	✓	✓	✓ (re-routed sections)*	✓	✓ (re-attempt 'no access' lands and re-routed sections)*
Treated Water Pipeline from the BPT to the TPR		✓	✓ (re-routed sections)*	✓	—	✓	✓	✓	✓ (re-routed sections)*	✓	✓ (re-attempt 'no access' lands and re-routed sections)*
38 kV Uprate Works	The footprint of the 38 kV Uprate Works, and a minimum 30m wide buffer along the length of the existing 38 kV OHLs and associated infrastructure (occasionally areas up to 50m from the existing lines were surveyed where land access agreements were issued), as well as a 15m wide corridor along the proposed access tracks.	—	—	✓	✓	—	✓	—	—	✓	✓

Note:
Cells highlighted grey indicate that some habitat surveys were undertaken outside of the optimal survey season.

* The selection of the route of the Treated Water Pipeline was an iterative process which resulted in various re-routing decisions (refer Chapter 3: Consideration of Reasonable Alternatives). Gaps in the field study area as a result of re-routes were captured during surveys in subsequent years.

54. Detailed Botanical Surveys of the Proposed Project and previous iterations of the project were carried out between 2017 and 2025 at target areas assessed as being of potential national importance or greater (i.e. potential Annex I habitats outside of European sites), and areas identified as having potential for rare or protected flora, as well as at the infrastructure sites which would be subject to permanent habitat loss (i.e. consideration of sites that could potentially support qualifying interests/special conservation interest species). Botanical surveys are summarised in Table 2.4. Botanical surveys were not repeated for sites where the habitats and habitat conditions were verified as unchanged (i.e. the data from the botanical survey was still considered to be valid) during habitat surveys in subsequent years (as detailed in Table 2.3), or where changes to the route of the Proposed Project resulted in sites being no longer situated within the ZoI. During the detailed Botanical Surveys, additional relevé (vegetation plot) data were collected. The methodologies for each of these surveys are provided in:

- Appendix H (Parteen Basin Habitat Assessment)
- Appendix I (Assessment of the Woodland Near Parteen Weir)
- EIAR Appendix A8.3 (Site Description of Coagh Upper Fen, County Offaly)
- EIAR Appendix A8.4 (Target Habitat Surveys Report)
- EIAR Appendix A8.5 (Rare Plants Surveys Report).

Table 2.4: Summary of Detailed Botanical Surveys

Locations	Survey Area	Dates of Surveys											
		June 2016	August 2016	March 2017	June 2017	August 2018	August 2019	August 2020	September 2021	August 2022	May and June 2023	August 2024	June 2025
RWI&PS	The footprint of the Proposed Project (or previous iterations of the project depending on the year of the survey)	✓	—	—	—	—	—	✓	—	—	—	—	—
WTP		—	—	—	✓	—	—	✓	—	—	—	—	—
BPT		—	—	—	✓	—	—	—	—	—	—	—	—
BPS		—	—	—	—	—	—	—	—	—	—	—	—
FCV		—	—	—	—	—	—	—	—	—	—	—	—
TPR		—	—	—	✓	—	—	—	—	—	—	—	—
RWRMs	Various habitats of potential national importance or greater within the Zone of Influence (ZoI) along the Treated Water Pipeline (or previous iterations of the project depending on the year of the survey)	—	—	—	—	—	—	—	—	—	—	—	—
Treated Water Pipeline from the WTP to the BPT		—	—	—	✓	✓	—	—	—	✓	✓	—	—
Treated Water Pipeline from the BPT to the TPR		—	—	—	✓	✓	—	—	—	—	✓	✓	—

Locations	Survey Area	Dates of Surveys											
		June 2016	August 2016	March 2017	June 2017	August 2018	August 2019	August 2020	September 2021	August 2022	May and June 2023	August 2024	June 2025
Sites of Interest (potential Annex I habitats) within the Potential ZoI of the Proposed Project	Coagh Upper Fen, County Offaly	✓	—	—	—	—	✓	—	—	—	—	—	—
	Ponds near Lough Ourna proposed Natural Heritage Area (pNHA), County Tipperary	—	✓	—	—	—	—	—	—	—	—	—	—
	Ardcroney Turlough, County Tipperary	—	✓	—	—	—	—	—	—	—	—	—	—
	Derrinclare Cutover, County Offaly	—	✓	—	—	—	—	—	—	—	—	—	—
	Valley Pond and Woodland at Cangort Park, County Offaly	—	✓	—	—	—	—	—	—	—	—	—	—
	Island Bog, County Offaly	—	✓	—	—	—	—	—	—	—	—	—	—
	Drumachon Bog, County Kildare	—	✓	—	—	—	—	—	—	—	—	—	—
	Ballythomas Turlough, County Tipperary	—	—	✓	✓	—	—	—	—	—	—	—	—
	Eminiska Grassland, County Tipperary	—	—	✓	✓	—	—	—	✓	—	—	—	—
	Coolfin Glebe Transition Mire, County Offaly	—	—	—	—	—	✓	—	—	—	✓	—	—
	Breaghmore Grassland, County Offaly	—	—	—	—	—	✓	—	—	—	—	—	—
	Rath More Spring, County Offaly	—	—	—	—	—	✓	—	—	—	—	—	—
	Raheenduff Fen, County Offaly	—	—	—	—	—	—	✓	—	—	—	—	—
	Loughourna, Nenagh, County Tipperary	—	—	—	—	—	—	—	✓	—	—	—	✓
	Derryvarroge, Cloona, County Kildare	—	—	—	—	—	—	—	✓	✓	—	—	—
	Coologmartin, Cloona, County Kildare	—	—	—	—	—	—	—	✓	—	—	—	—
38 kV Uprate Works	The footprint of the 38 kV Uprate Works	—	—	—	—	—	—	✓	✓	—	✓	—	—

55. The information obtained during these surveys was incorporated into the route selection process in order to avoid Annex I habitats, habitats that may support Annex I species, and sites of potential ecological value (e.g. sites used by regularly occurring migratory species or wetlands of international importance), where feasible.

56. European sites protected under the Habitats and Birds Directives were identified through the desktop study analysis and were avoided during the route and infrastructure selection process (EIAR Chapter 3: Consideration of Reasonable Alternatives), with the exception of the RWI&PS site located at Parteen Basin and the 38 kV Uprate Works within the Lower River Shannon SAC (Site Code: 002165), as this was not feasible for reasons outlined in the Final Options Appraisal Report (FOAR) (Jacobs TOBIN 2016; see Section 3.10). Detailed terrestrial habitat assessments were carried out at these sites in June and October 2016, August 2020, September 2021, and May 2022 and are summarised in Section 4.3.1 and Section 7.1.2.

2.5.1.3 Mammal Surveys

2.5.1.3.1 Bats

57. An array of bat surveys were conducted along the Proposed Project and previous iterations of the project between June 2016 to 2018 by TOBIN and from 2019 to 2025 (with the exception of 2023, due to project programme at the time; this is not considered a limitation as bat surveys were conducted in the years prior to and following 2023) by Bat Eco Services. The surveys were undertaken with regard to methodologies predominantly outlined within Collins (2016) with reference also made to Marnell *et al.* (2022), Aughney *et al.* (2018) and Billington & Norman (1997) for guidance in relation to survey (timing and survey design) and mitigation measures. While a 4th edition of the survey guidelines was published in September 2023, this report, for accuracy, refers to both Collins (2016; 2023). It is important to note that Collins (2016) is a document prepared for UK bat surveys. There are 18 species of bats in the UK and nine species in Ireland and as a consequence, the UK guidelines cannot be strictly applied to Ireland. Collins (2016; 2023) was used as a guide, along with the principal surveyors' experience, in order to undertake an appropriate level of surveying to gather information on the bat usage along the Proposed Project, with considerations to the scale of the Proposed Project and land access constraints. The surveys were undertaken to gather data on local bat populations that are likely to be present along the Proposed Project route. Due to the length of the Proposed Project, survey efforts were focused around areas along the route considered to have highly suitable bat habitat. Therefore, by undertaking daytime inspections of buildings/structures, static surveillance, dusk and dawn surveys, walking transects and driving transects, this array of survey methods documents the suite of bat species present within the landscape of the Proposed Project.

58. Daytime inspection surveys of suitable bat habitat were undertaken to determine the potential for bat roosts within the study area. The surveys considered the suitability of the roost site to support bats and identified the type of roost present. The determination of the type of roost present depends on the timing of the survey and the number of bat surveys completed, and were based on Collins (2016) roost type and suitability criteria.

59. Trees that may provide a roosting space for bats were classified using the Bat Tree Habitat Key (2018) and the classification system from Collins (2016). The Potential Roost Features (PRFs) listed in this guide were used to determine the Potential Bat Roost (PBR) value of trees. Trees identified as PBRs were inspected during the daytime where possible, for evidence of bat usage. Daytime inspections were undertaken of trees along the Proposed Project within areas visited during daytime inspections of buildings/structures (i.e. where landowner access was provided) and during deployment of static units. These inspections followed the Phase 1 guidance (Collins 2016) in order to make a list of trees within the Proposed Project that may be suitable as roosting sites for bats. Inspections were undertaken

visually, from the ground, with the aid of a strong torch beam (LED Lenser P14.2) during the daytime searching for PRFs.

60. Structures, buildings and other likely places that may provide a roosting space for bats were inspected during the daytime for evidence of bat usage. Evidence of bat usage is in the form of actual bats (visible or audible), bat droppings, urine staining, grease marks (oily secretions from glands present on stonework) and claw marks. Inspections were undertaken visually with the aid of a strong torch beam (LED Lenser P14.2) and endoscope (General DC5660A Wet/Dry Scope). Buildings were assessed to determine their suitability as a bat roost and described using the parameters Negligible, Low, Medium or High suitability (Billington & Norman 1997). The level of suitability informed whether a dusk or dawn survey was completed for individual structures. Buildings that may be directly impacted by the Proposed Project were surveyed more than once and in multiple years to meet Collins (2016; 2023) criteria. All other buildings outside the potential direct impact of the Proposed Project (i.e. potential indirect impacts) and deemed as suitable bat roosts and/or where bat evidence was recorded, were generally only surveyed once in order to determine if a bat roost was present, due to access constraints. As a consequence, the survey protocol for some buildings did not meet Collins (2016; 2023) recommendations; however, surveys results were still considered robust and suitable to adequately inform the assessment, based upon professional judgement. Stone structures and bridges were assessed using a four-point classification system designed for bridges by Billington & Norman (1997).

61. Dusk emergence surveys were completed from 10-15 minutes before sunset to at least 110 minutes post sunset and the surveyors positioned themselves adjacent to the building/structure to be surveyed to determine if bats are roosting within, location of roost(s), number of bats, and bat species. While the start time is five minutes later than Collins (2016), it was deemed appropriate for the detection of the bat species resident in Ireland. Dawn surveys were completed from 110 minutes before sunrise to 10-15 minutes after sunrise. Surveys were completed during mild and dry weather conditions with air temperature 8°C or greater (Collins (2016) recommends that surveys are completed close to optimal conditions of 10°C or above; however, due to the fact that Ireland tends to have more changeable weather conditions than those of the UK, the standard followed was deemed suitable by the principal surveyor using experienced professional judgement). The following equipment was used:

    - Surveyor 1 (Principal surveyor): Anabat Walkabout Full Spectrum Bat Detector and Petersson D200 Heterodyne Bat Detector
    - Surveyor 2: Bat Logger M2 Spectrum Bat Detector and Wildlife Acoustics Echo Meter Touch2 Pro (Android) connected to Samsung Galaxy Tab S3 and Petersson D200 Heterodyne Bat Detector
    - Surveyor 3: Anabat Scout Full Spectrum Bat Detector and Wildlife Acoustics Echo Meter Touch (Generation 1, Apple IOS) connected to iPad 2 (32 GB storage) and Petersson D200 Heterodyne Bat Detector
    - Night Vision Aids were also used during dusk and dawn surveys. The equipment deployed included: Guide TrackIR Pro25 thermal imagery scope, a Guide TrackIR Pro19 thermal imagery scope, and Sony Camcorder with night-vision capability coupled with Dedo RedLight.

62. Walking transects were completed following dusk emergence surveys and involved the surveyor(s) walking the survey area, noting the time, location and bat species encountered. Walking transects were generally completed along boundaries of fields and laneways surrounding the buildings surveyed/inspected. Bat activity was recorded using full spectrum bat detectors and all bats encountered were mapped.

63. Driving transects were undertaken for large study areas (i.e. the road network along and intersecting the Proposed Project). The length of the Proposed Project was examined and twelve driving transects were designed along the road network. Wildlife Acoustics Echo Meter Touch2 Pro (Android) connected to Samsung Galaxy Tab S3 was used for this survey type and was located outside on the passenger side of a vehicle. The vehicle was driven at 24km/hr following BCIreland's car-based bat monitoring

methodology (Aughney *et al.* 2018). The time, location (grid reference) and bat species encountered were recorded. Validation of bat records was completed by the principal bat surveyor prior to mapping.

64. A passive bat detector survey was undertaken for Bat Target Areas (i.e. areas along the Proposed Project identified as having bat roost potential and/or good commuting corridors), break-out areas and additional points deemed important to identify bat species utilising the areas (e.g. water crossing points). Static units were deployed for three to four nights' surveillance with recordings set from 30 minutes before sunset to 30 minutes after sunset at the majority of survey sites; meanwhile additional habitats outside the Proposed Project were sampled for a minimum of one night (e.g. adjacent woodlands). In 2025, as part of the tree surveys of PBRs, static surveillance was also undertaken directly beside the identified PBRs for a minimum of one night to provide bat activity in vicinity of the tree in order to supplement night surveys undertaken. Wildlife Acoustics Song Meter SM2, SM4 Bat FS and Mini Bat FS Platform Units and Elekon BatLogger A+ units use real-time recording as a technique to record bat echolocation calls, and using specific software, the recorded calls are identified. It is these sonograms (2-D sound pictures) that are digitally stored on the SD card (or micro SD cards depending on the model) and downloaded for analysis. The recordings were analysed using Wildlife Acoustics Kaleidoscope Pro.

2.5.1.3.2 Otter

65. Otter (*Lutra lutra*) surveys were conducted with regard to the 'Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes' (NRA 2009) guidelines. Field signs of otter activity include spraints (otter droppings), footprints, food remains, slides, pathways/trails, holts, couches and natal dens. Holts tend to be tunnelled holes in riverbanks or cavities in tree roots or under rock piles, whereas couches are above-ground resting sites where there is no alternative site for breeding. Couches are generally mats of nesting material that can be located in vegetation on riverbanks or away from water in secluded areas (NRA 2009).

66. Table 2.5 summarises the otter surveys undertaken. The optimal survey period for protected mammals such as otter is September to May when there is less vegetation (NRA 2009); however, these surveys can still be completed during the sub-optimal period of June to August, and be representative such that an adequate conclusion can be drawn in respect of the likelihood of significant effects on European sites and their respective qualifying interests.

Table 2.5: Summary of Otter Surveys

Timing of Surveys	Areas Surveyed
Between May and June 2016	Suitable habitat within the RWI&PS, WTP, BPT and TPR and along the 'Preferred Pipeline Corridor' at the time.
July and August 2017	Sections of the route where design changes had occurred since 2016 and locations where otter activity was recorded in 2016 were surveyed in 2017. Where active holts were identified the survey area was extended up to 75m from the route, where suitable habitat occurred, to check for alternative breeding sites within the same territory.
September 2017	Suitable habitat within the Construction Compounds and Pipe Storage Depots at the time.
Between June and September 2018	In order to maintain validity of the baseline data, otter surveys were repeated in 2018. Surveys were carried out at the RWI&PS, WTP, BPT and TPR and along previous iterations of the project, as well as a 75m buffer either side, where suitable habitat occurred.
Between September and October 2018	Otter surveys were conducted along the proposed 38 kV Uprate Works (approximately 30m from structures and along the line and access tracks where suitable habitat for resting locations occurred and 150m upstream and downstream along watercourses and canals).
June 2019	Otter surveys were conducted along the proposed 38 kV Uprate Works (approximately 30m from structures and along the line and access tracks where suitable habitat for resting locations occurred and 150m upstream and downstream along watercourses and canals).
Between September and November 2019	Sections of the route where otter activity was recorded in 2018 were surveyed in 2019. Where active holts were identified the survey area was extended up to 150m from the route, where suitable habitat occurred, to check for alternative breeding sites within the same territory.

Timing of Surveys	Areas Surveyed
Between July and October 2020	In order to maintain validity of the baseline data, otter surveys were repeated in 2020. Surveys were carried out along previous iterations of the project, as well as a 150m buffer either side where suitable habitat occurred.
Between July and October 2021	Sections of the route where design changes had occurred since 2020 and along the proposed 38 kV Uprate Works (approximately 30m from structures and along the line and access tracks where suitable habitat for resting locations occurred and 150m upstream and downstream along watercourses and canals) were surveyed in 2021. Where active holts were identified the survey area was extended up to 150m from the route, where suitable habitat occurred, to check for alternative breeding sites within the same territory.
Between July and October 2022	In order to maintain validity of the baseline data, otter surveys were repeated in 2022. Surveys were carried out along a previous iteration of the project, as well as a 150m buffer either side where suitable habitat occurred. Otter surveys were also carried out at Parteen Basin in September 2022 to check for suitable habitat and activity.
June 2023	Areas of the Proposed Project which could not be accessed in previous years were surveyed in 2023. New holts were recorded, or existing holts verified. Where active holts were identified, the survey area was extended up to 150m from the route where suitable habitat occurred, to check for alternative breeding sites within the same territory.
Between June and October 2024	In order to maintain validity of the baseline data, otter surveys were repeated in 2024. Surveys were carried out along the Proposed Project at the time, as well as a 150m buffer either side where suitable habitat occurred. Otter surveys were also carried out at Parteen Basin in October 2024 to check for suitable habitat and activity.
June 2025	Areas of the Proposed Project which could not be accessed in previous years were surveyed in 2025. New holts were recorded, or existing holts verified. Where active holts were identified, the survey area was extended up to 150m from the route where suitable habitat occurred, to check for alternative breeding sites within the same territory.

2.5.1.4 Breeding Bird Surveys

67. Breeding bird surveys were conducted between 2016 and 2024, within the study area of the Proposed Project and previous iterations of the project, with the exception of some 2020 surveys (breeding walkover and boats surveys which were cancelled due to COVID-19 restrictions), and 2023 (due to project programme) (Table 2.2). This is not considered a limitation as breeding bird surveys were conducted in the years prior to and following 2020 and 2023. Due to the evolving nature of the Proposed Project (i.e. previous iterations of the project), following recommendations during consultation, updates of guidelines, identification of important bird areas during previous surveys or implications from the COVID-19 pandemic, various survey methods were adopted, and new survey areas selected or old ones discontinued.

68. Survey design and target surveys were undertaken following consideration of desktop study results, consultation responses (see Section 2.7.3) and based on the typical bird communities likely to be found within the habitats of the study area (see EIAR Appendix A8.21: Breeding Bird Surveys Summary Report for further details on target species selection and study area). Target species were identified as species of high conservation concern and sensitive to the Proposed Project. They are species listed on Annex I of the Birds Directive, birds listed as being of high (Red Listed) and medium (Amber Listed) conservation concern as identified by Gilbert *et al.* (2021), or birds at risk from collisions with OHLs as per EirGrid (2020). Survey methods employed include breeding bird walkover surveys, breeding bird water bird boat surveys, and Vantage Point (VP) surveys.

2.5.1.4.1 Breeding Bird Walkover Survey

69. The breeding bird walkover survey method followed an adapted O'Brien and Smith (1992) method for censusing lowland breeding wader populations. This adapted method was designed by TOBIN to survey a number of species simultaneously and is a generic methodology, rather than species-specific. Thus, it allowed surveyors to also survey for other target species, including passerines and raptors. During a multidisciplinary walkover survey in 2016 of a previous iteration of the project, a habitat assessment and bird surveys were undertaken to detect the presence, or likely presence of breeding birds and suitable habitat for breeding birds. This process was repeated for the Proposed Project. From this, potentially

suitable breeding habitats for target species were identified and were selected for specific breeding bird walkover surveys between 2017 and 2024 (with the exception of 2020 and 2023). Three visits were made to selected locations, in early morning, April to June inclusive. The number of birds was recorded, and a breeding bird status assigned based on a British Trust for Ornithology (BTO) classification.

70. Breeding raptor activity was also noted during breeding bird walkover surveys. It was considered that the breeding bird walkover survey methods were sufficiently similar to breeding raptor survey methods as described by Hardey *et al.* (2013) to allow both species groups to be surveyed simultaneously without difficulty, i.e. initial breeding raptor survey visits involve a broadly similar walkover methodology to O'Brien and Smith (1992). However, where breeding raptors of conservation concern were recorded during the walkover survey, subsequent visits to the location included VP watches, as appropriate. Raptor survey methods involved surveying all areas of suitable habitat for visual registrations and/or physical signs (feathers, pellets, prey remains or white-washing) on prominent features in the landscape. The location of any breeding behaviour was noted for further investigation. Nest sites were located by conducting watches of potential nest sites from a distance which would not cause disturbance. Breeding was confirmed by observations of any of the following: a food pass between two adults, adults carrying prey, nest with eggs or young found, and/or recently fledged young.

71. The timing of watches was tailored to the ecology of the target species. Field information recorded included: date, location, weather, survey start and end time, species observed, time of observation, number of individuals per observation, reference number to flight line. All flight lines of target species were mapped on field sheets or iPads. Behavioural observations were also recorded. The aim of these surveys was to establish the distribution, breeding status and abundance of breeding birds within the study area of the Proposed Project.

2.5.1.4.2 Breeding Water Bird Boat Survey

72. Parteen Basin was surveyed by boat over three visits during the breeding seasons between April and June 2016 to 2024 (with the exception of 2020 and 2023). When surveying large stretches of standing water from a boat, two observers are essential to ensure an accurate count of the birds present on the water body. Particular attention was paid to ditches, reedbed edges and small bays. The survey was conducted in the morning and followed a course which passed as close to suitable habitat as was (safely) possible. Surveyors split the tasks of observing and recording. The species and the sex of individuals and groups were recorded. The results of the census were interpreted as follows: lone females, lone males and each male of a group (of less than five) were counted as breeding pairs, in accordance with Gilbert *et al.* (1998). Large groups and flocks were considered non-breeding or wintering flocks. A breeding bird status was also assigned based on a BTO classification. The number of pairs was calculated per visit, with the maximum number of pairs used for comparisons between years.

2.5.1.4.3 Vantage Point Surveys

73. The VP survey methodology broadly followed guidelines issued by SNH (2017). Vantage Point surveys aim to quantify the level of flight activity, pattern of use and its distribution over the survey area. Vantage Points are fixed locations, which are strategically positioned to provide a maximum viewshed of the survey area from a minimum number of locations. The viewshed of a given VP should extend to a distance of no greater than 2km and include an arc of no greater than 180 degrees (as per SNH 2017). The timing of watches was tailored to the ecology of the target species present on-site, including dawn, day, and dusk surveys. Recorded field information recorded included: date, VP location, weather, survey start and end time, species observed, time of observation, number of individuals per observation, reference number to flight line and flight height. All flight lines of target species were mapped on field sheets. Behavioural observations, sex and breeding status were also recorded.

74. Vantage Point surveys were undertaken from fixed locations at Clarisford Park and Ardcloony in County Clare on a monthly basis (six hours per VP per month) from July to September 2019 to 2024 and

overlooked Parteen Basin, where the RWI&PS is proposed. These surveys were conducted over a three-month period at the end of the breeding season to determine post-breeding success and locations of bird congregations within Parteen Basin. Vantage Point surveys were undertaken from July to September in order to have a full breeding bird survey season data set (i.e. other breeding bird surveys at or near VP sites (such as breeding walkover survey and boat surveys, which have been described above) covered the months from April to June, and VPs covered July to September).

75. Vantage Point Surveys at Kildoorus on the Lower River Shannon were undertaken between April and September 2019 to 2024 and overlooked the existing 38 kV OHL where it crosses the Shannon. These surveys were conducted to observe the current interactions and flightlines at the existing powerlines.

76. In 2022 additional VP surveys were conducted at four locations at the proposed infrastructure sites. These included the WTP, BPT, BPS and TPR. These were undertaken between April and September 2022 and overlooked the areas where the proposed infrastructure sites would be constructed. These surveys were conducted to observe the current interactions and flightlines at the proposed infrastructure locations. These surveys were not repeated in subsequent years, as results indicated these sites are not frequented by Annex I bird species.

77. Weather conditions during all surveys were adequate for surveys. No surveys were conducted during windy (> force five)/very wet conditions, which can affect visibility. The VP survey locations are shown in EIAR Appendix A8.21: Breeding Bird Surveys Summary Report.

2.5.1.5 Wintering Bird Surveys

78. Wintering Bird Surveys were conducted between 2015/2016 and 2024/2025 within the study area of the Proposed Project and previous iterations of the project. Due to the evolving nature of the Proposed Project, following recommendations during consultation, updates of guidelines, and identification of important bird areas during previous surveys, various survey methods were adopted, and new survey areas selected, or old ones discontinued.

79. Survey design and target species selection were undertaken following consideration of the desktop study results, the consultation responses, and based on the typical bird communities likely to be found within the habitats of the ornithological study area (see EIAR Appendix A8.22: Winter Bird Surveys Summary Report for further details on target species selection and study area). Target species were identified as species of high conservation concern and/or sensitive to the Proposed Project. They are species listed on Annex I of the Birds Directive, birds listed as being of high (Red Listed) and medium (Amber Listed) conservation concern as identified by Gilbert *et al.* (2021), or birds at risk from collisions with over headlines as per EirGrid (2020). Survey methods employed included VP surveys, I-WeBS, and hen harrier winter roost surveys.

2.5.1.5.1 Vantage Point Surveys

80. The VP survey methodology was the same during the winter bird season as the breeding bird season (see Section 2.5.1.4) and broadly followed guidelines issued by SNH (2017). The timing of watches was tailored to the ecology of the target species present on-site, including dawn, day and dusk surveys. A minimum of 36 hours per VP (six hours per month) per season was recorded. Field information recorded included: date, VP location, weather, survey start and end time, species observed, time of observation, number of individuals per observation and the reference number to flight line. All flight lines of target species were mapped on field sheets. Behavioural observations were also recorded.

81. For the winter seasons from 2015/2016 to 2024/2025 (excluding 2021/2022, when no surveys were undertaken due to project programme at the time; this is not considered a limitation as wintering bird surveys were conducted in the years prior to and following 2021/2022), VP surveys were undertaken from three fixed point locations around upper Parteen Basin and lower Lough Derg. Communications

with NPWS in November 2014 highlighted that tufted duck (*Aythya fuligula*) were present in large numbers during the winter months in Parteen Basin. Therefore, the aim of these surveys was to establish if Parteen Basin provides supporting habitat to wintering water birds generally and in particular: tufted duck, cormorant (*Phalacrocorax carbo*) and goldeneye (*Bucephala clangula*) (listed as species of special conservation interest of the Lough Derg (Shannon) SPA), and little grebe and mute swan populations (recorded in noteworthy numbers within the Lough Derg (Shannon) SPA) and to assess connectivity between Parteen Basin and Lough Derg. The surveys were designed to map the connectivity between Lough Derg and Parteen Basin in order to determine whether Parteen Basin constituted a non-designated sub-site of the wider Lough Derg (Shannon) SPA, with nationally important numbers of resident wintering wildfowl.

82. For the winter seasons of 2019/2020, 2020/2021, 2022/2023, 2023/2024, and 2024/2025 additional VP surveys were undertaken from four fixed point locations to gather winter bird data within the study area of the 38 kV Uprate Works. These locations were positioned to observe target species in their suitable habitats along the existing OHLs, and included Parteen Basin, the Lower River Shannon, and the Headrace Canal under existing OHLs. The study area was defined based on the observed bird usage in the area and the availability of suitable habitat for targeted bird species along the 38 kV Uprate Works. The aim of these surveys was to establish the flight lines of target species commuting in the area of the Proposed Project, with particular emphasis along the Lower River Shannon SAC, and to determine if there could be a collision risk with OHLs.

83. For the winter seasons 2020/2021, 2022/2023, and 2024/2025 additional VP surveys were undertaken from five fixed locations along the Proposed Project and previous iterations of the project, specifically at the key infrastructure sites. These include the RWI&PS, WTP, BPT, BPS, and TPR. In 2023/2024 only the RWI&PS and WTP surveys were repeated as the results from the surveys undertaken at the BPT, BPS and the TPR did not yield any significant findings in previous years (i.e. low numbers of target species were recorded). The location of each VP is shown in EIAR Appendix A8.22 (Winter Bird Survey Summary Report). The aim of these surveys was to determine the winter bird usage of these areas and locate any potential roosting, feeding, or commuting locations around the sites.

2.5.1.5.2 Wintering Water Bird Counts – (I-WeBS)

84. The I-WeBS is an annual monitoring programme which surveys winter water birds across Ireland. The survey runs from September to March each winter and involves conducting monthly counts during the survey season.

85. Monthly counts were conducted within the study area of the Proposed Project and previous iterations of the project between 2015/2016 and 2024/2025 (excluding 2021/2022) using the I-WeBS methodology 'I-WeBS Counter Manual – Guidelines for Irish Wetland Bird Survey Counters' co-ordinated by BWI (BWI 2017). Counts were conducted during daylight hours (at dawn or before dusk) from suitable VPs using binoculars and/or telescope as required. Birds were recorded on a count form according to their BTO species code. Information collected included numbers of wildfowl or wader species, the presence of marked birds (leg-ringed or neck-collared), weather conditions, and habitat types.

86. Counts were conducted at suitable wetland habitats within a 2km buffer of the Proposed Project as per SNH (2017) and also included all of Lough Derg and Parteen Basin, and the upper reaches of the Lower River Shannon (from Killaloe to O'Briensbridge). Known I-WeBS sites were surveyed in addition to areas of suitable habitat or where target species were known to congregate. These habitats were determined by use of aerial mapping and extensive windscreen surveys along the Proposed Project, in addition to knowledge obtained while carrying out field surveys. The location and grid coordinates of these sites are provided in EIAR Appendix A8.22 (Winter Bird Surveys Summary Report). It should be noted that survey sites and subsites within the study area of previous iterations of the project were reviewed and some

added/removed prior to commencing the 2020/2021 winter surveys. As a result, some locations surveyed from 2015/2016 to 2019/2020 were no longer included.

87. At Lough Derg, I-WeBS VPs were selected at regular intervals around the lake in order to achieve maximum coverage of the water body and its adjoining shores. Due to the size of Lough Derg, the surveys were usually carried out over two consecutive days per month, where the lake was separated between the east and west side. Counts at Parteen Basin were carried out on the same day. From winter 2019/2020 onwards three surveyors were deployed at the same time to cover the lake and to avoid inaccuracies by double counting. One surveyor covered the eastern shore of the lake, a second surveyed the western shore, and a third surveyor covered Parteen Basin and sites along the southern shore of Lough Derg.

88. The I-WeBS surveys aimed to assess the distribution and abundance of wintering water birds within the study area of the Proposed Project and to determine if populations of species recorded were of National or International importance. Where a species is present at a site in concentrations of 1% or more of the 'flyway' population (i.e. a route between breeding and wintering areas taken by concentrations of migrating birds), the site is said to be of international importance for that species. National importance is based on a site supporting 1% or more of the all-Ireland population estimate of a species. The 1% thresholds for national and international populations of each bird species are listed in Annex D of EIAR Appendix A8.22 (Winter Bird Survey Summary Report). The 1% national estimates are based on Burke *et al.* (2018), while the 1% international estimates are based on data retrieved from Wetlands International (2022).

2.5.1.5.3 Hen Harrier Roost Surveys

89. The Proposed Project traverses three 10km grid squares with known hen harrier roosts (O'Donoghue 2020). Hen harrier roost surveys were conducted where suitable roosting habitat was found within 2km of the Proposed Project and previous iterations of the project during the winter months from 2016/2017 to 2020/2021. These sites were reviewed and were also considered appropriate study areas for the Proposed Project. Hen harrier roost survey methods followed those set out by Gilbert *et al.* (1998) and the Irish Hen Harrier Winter Roost Survey recommendations from O'Donoghue (2019). Surveyors were in place an hour and a half before sunset and recorded all observations of hen harrier until last visible light. Information recorded by surveyors from the VPs included the number of hen harrier entering a roost, the time, age and sex, where possible.

90. Hen harrier may roost communally in winter, generally in rank ground vegetation (Clarke and Watson 1997). Suitable roosting habitat is typically restricted to dense vegetation such as heather or young commercially planted conifers. Although this species breeds in upland areas, wintering birds disperse widely and can frequently be found in lowland areas of the Midlands of Ireland. Hen harrier roost surveys were conducted from the edge of public roadways at nine locations in winter 2016/17. This was reduced to seven locations the following winter season due to limited potential, lack of hen harrier recordings, and distance from the previous iteration of the project. During the winter 2019/2020 two new locations were added, and one old location was removed, leaving a total of eight survey locations. During winter 2020/2021 the number of survey locations was increased to fourteen following feedback from consultations with the Irish Hen Harrier Winter Survey (see Section 2.7.4). Hen harrier activity continued to be monitored within the study areas between 2022 and 2024 during terrestrial ecology and breeding and wintering bird surveys, during which time hen harrier were rarely recorded and no potential winter roosts were identified. Therefore, hen harrier winter roost surveys were not repeated in subsequent years. The locations of the hen harrier roost surveys are shown in EIAR Appendix A8.22 (Winter Bird Surveys Summary Report).

2.5.1.6 Aquatic Ecology Surveys

91. All water bodies which could be affected directly or indirectly by the Proposed Project were considered as part of this assessment, including first-order watercourses and drainage ditches. All EPA mapped water bodies crossed by the Proposed Project and previous iterations of the project were selected for detailed aquatic surveys typically between May and September from 2016 to 2024 (see Table 2.2). During multidisciplinary walkover surveys, several minor watercourses and drains were identified (not mapped by the EPA) and were subsequently included in the aquatic assessments between 2019 and 2025. The Proposed Project watercourse crossings are listed in Appendix J (Watercourse Crossings and Pathways to European Sites).

92. The surveys completed at each site (as discussed in the following sub-sections) were at a level required to make an evaluation on biological water quality, fisheries value, aquatic habitat value, and presence of qualifying interest species. Survey limitations in relation to season and land access are discussed in Section 2.5.4. The level of survey effort undertaken at each watercourse crossing is provided in EIAR Appendix A8.14 (Watercourse Crossing Data).

93. The Proposed Project has been carefully positioned (see EIAR Chapter 3: Consideration of Reasonable Alternatives) to avoid water bodies where possible, in particular water bodies within European sites, thereby minimising the number of watercourse crossings and limiting direct impacts on European sites. A total of 639 watercourse crossings were identified within the Proposed Project, 604 of these crossings have a pathway to one or more European sites. It should be noted, for the majority of crossings, the European sites are at a considerable distance downstream of the Proposed Project (see Section 4.1).

94. As mentioned, the RWI&PS is located at Parteen Basin in the Lower River Shannon SAC. There are no surface water features of ecological importance or hydrological pathways to any European sites within or from the footprint of the WTP, BPT, BPS, FCV or TPR. The closest mapped water body to the WTP is the Kilmastulla_050 (SC: 25_3881) which is located approximately 540m south of the site at its closest point. The closest mapped water body to the BPT is the Ballyfinboy_040 (SC: 25_3690) which is located approximately 1.45km south-west of the site at its closest point. The closest mapped water body to the BPS is the Camcor_030 (SC: 25_705) which is located adjacent to the BPS site, along its eastern boundary. The closest mapped water body to the FCV is the Reeves_010 (SC: 09_2200) which is located approximately 632m north-west of the site. The closest mapped water body to the TPR is the Liffey_180 (SC: 09_1131; Lucan Stream) which is located approximately 610m north-east of the site at its closest point.

95. A drainage ditch (see WBX004 on EIAR Figure 8.12), which flows north to south along the WTP access road, would receive surface water drainage from the WTP in operation. This will discharge into the drainage ditch, WBP221, crossed by the proposed access road immediately north of its junction with the R445 public road, and ultimately into the Kilmastulla_050 approximately 195m downstream (which is part of the Lower River Shannon SAC at its confluence with the drain). The proposed access road to the WTP approaches the site from the south, connecting the site with the R445 (formerly the N7 main Limerick to Dublin Road) and crosses open farmland and forested land. The route has been positioned to avoid the boundaries of the Lower River Shannon SAC. However, the route does cross Knockadromin Stream (WCX002, a tributary of the Kilmastulla River), approximately 35m upstream of the Lower Shannon River SAC and a drainage ditch (WBP221) approximately 150m upstream of the Lower River Shannon SAC.

96. A number of aquatic surveys were carried out within the study area (Section 2.3) of the RWI&PS in order to assess the potential impact on the qualifying interests of the Lower River Shannon SAC. These surveys are discussed in Section 2.5.1.6.

2.5.1.6.1 Proposed Project Surveys

97. An aquatic habitat assessment was completed at each of the watercourses crossed by the Proposed Project. The River Hydromorphology Assessment Technique (RHAT) (Northern Ireland Environment Agency 2009) was generally employed as a tool for ecologically assessing watercourses potentially impacted by the Proposed Project. The watercourses surveyed and the results are listed in EIAR Appendix A8.14 (Watercourse Crossing Data). The survey focused on the crossing point (i.e. stretch of watercourse within the Proposed Project) as well as the wider study area (i.e. 150m upstream and downstream of the crossing point, where access permitted, based on the ZoI for otter). The survey distance was determined based on the nature of the proposed works and the distance up to which protected fauna such as otter would likely be affected. Where access was not permitted to the crossing or 150m upstream or downstream of the crossing, a precautionary approach was taken and an assessment was made based on information extrapolated from the surrounding environment as well as desktop study information. The hydromorphological criteria assessed in the RHAT included:

- Stream width and depth and other physical characteristics
- Flow type, listing percentage of riffle, glide, and pool in the sampling area
- Instream vegetation
- Substrate type, listing substrate fractions in order of dominance, i.e. large rocks, cobble, gravel, sand, silt
- Barriers to continuity
- Bank structure and stability
- Bankside vegetation
- Presence of INNS
- Riparian land cover.

98. Qualitative sampling of benthic macroinvertebrates was undertaken at suitable sites within the study area using kick-sampling methods (Toner *et al.* 2005; Feeley *et al.* 2020). Many sites could not be kick sampled due to unsuitable kick sampling conditions (e.g. peat substrate), dry and/or heavily vegetated watercourses, or access restrictions (e.g. too deep to safely wade, fenced off, or surrounded by thick vegetation) (EIAR Appendix A8.14: Watercourse Crossing Data; Section 2.5.4). These watercourses were, however, still subject to fisheries assessment visual surveys (i.e. a visual assessment from the riverbank of the habitat suitability and fisheries potential of the watercourse). Where qualitative sampling was undertaken, it involved kick sampling with a standard 1mm mesh D-shaped kick net, which was placed on the riverbed with the mouth of the net directed upstream. The area just upstream of the net was disturbed (with the foot, in a kicking motion) for two minutes in order to dislodge invertebrates, which were subsequently caught in the net. Different habitats in the water body, such as fast-moving riffles, shallow water, and slow water were sampled during the two minutes to ensure that a sample representative of the site was collected. After kick sampling, stone washing and weed sweeping were also carried out at available habitats. All samples of invertebrates were combined for each site, live-sorted on the riverbank and identified to the level required to assign a Q-rating score.

99. An assessment of the occurrence of Annex II species (e.g. white-clawed crayfish (*Austropotamobius pallipes*)) at the Proposed Project watercourse crossings was assessed by underwater visual observation using bathyscopes or hand-searching, in an upstream direction, which was considered to be robust to determine presence/absence for this species. Where the presence of suitable habitat was identified (or based on historical records of the species presence), targeted surveys were also undertaken using sweep net methods, under licence from NPWS. The most appropriate method employed was determined based on the characteristics of individual watercourses. Due to the scale of the Proposed Project, and significant number of watercourse crossings, trapping and torchlight surveys were not undertaken.

100. Suitable juvenile lamprey (ammocoetes) habitat was identified from the descriptions given in Maitland (2003). Lamprey habitat preferences change with the stages of their life cycle. They show a preference for gravel-dominated substratum for spawning. After hatching the larvae swim or are washed downstream by the current to areas of sandy silt in still or slow-flowing water where they burrow and spend the next few years. Lampreys therefore require mainly silt and sand-dominated substratum for nursery habitat. Where identified, suitable silt beds within the Proposed Project were selected for further examination by hand searching. Other important environmental characteristics that were considered when assessing optimal ammocoete habitat were shallow waters with low water velocity, and the presence of organic detritus and/or plant material.

101. Each watercourse was rated during the field surveys between 2016 and 2025 (EIAR Appendix A8.14: Watercourse Crossing Data) in terms of habitat suitability for salmonid spawning potential. In general, the more diverse the stream habitat in terms of substrate, flow rate, depth, riparian vegetation, light conditions etc., the richer the biological community is likely to be, and the more suitable it is likely to be for salmonid fish. Assessment of the quality of salmonid spawning habitat, nursery habitat and adult habitat was based on professional expertise and on published information such as the following:

- Typical spawning sites are the transitional areas between pool and riffle where flow is accelerating and depth decreasing, where gravel of suitable coarseness is present and interstices are kept clean by upwelling flow (Peterson 1978, Bjorn and Reiser 1991)
- Salmon fry and parr occupy shallow, fast-flowing water with a moderately coarse substrate with cover (Symons and Heland 1978, Baglinière and Champigneulle 1986)
- Deep or slow-moving water, particularly when associated with a sand or silt substrate, does not support resident juvenile salmonids (Wańkowski and Thorpe 1979, Baglinière and Champigneulle 1986)
- Suitable cover for juveniles includes areas of deep water, surface turbulence, loose substrate, large rocks and other submerged obstructions, undercut banks, overhanging vegetation, woody debris lodged in the channel, and aquatic vegetation (Heggenes 1990, Bjorn and Reiser 1991, Haury *et al.* 1995)
- Bjorn and Reiser (1991) suggest that proximity of cover to spawning areas may be a factor in the selection of spawning sites by some salmonid species.

102. Desktop study information indicated that freshwater pearl mussel does not occur in the study area of the Proposed Project or immediately downstream (Proposed Project crosses watercourses within the Figile River system that drain to the River Barrow, and the River Barrow and River Nore SAC (designated for freshwater pearl mussel) more than 20km downstream). Conditions in the Figile River (which would be crossed by trenchless excavation) and downstream to the confluence with the River Barrow are unsuited to freshwater pearl mussel due to low gradient and peaty substrate. The distribution and abundance of freshwater pearl mussel within the catchment is well documented and there is no potential for any populations within the Figile River. Therefore, no dedicated field surveys were undertaken for this species. However, as noted, a fisheries assessment was undertaken at each watercourse crossing and potential impacts on salmonids (hosts for freshwater pearl mussel) were considered (Section 7.4). Freshwater pearl mussels also are known to occur abundantly in parts of the Cloon River, County Clare, which flows into the Shannon Estuary, downstream of Limerick city and beyond the ZoI of the Proposed Project.

2.5.1.6.2 Lower River Shannon SAC Surveys

103. The aquatic environment within the Lower River Shannon SAC in the study area of the proposed RWI&PS was surveyed for the presence of Annex I habitat(s) and/or Annex II species in August 2017, August 2019, June 2021, and August 2024. The survey was carried out by undertaking a series of three transects from the shore to approximately 50m offshore (to fully cover the maximum extent of the RWI&PS) at locations within and surrounding the proposed RWI&PS by self-contained underwater

breathing apparatus (scuba). The central transect was in the middle of the RWI&PS location, while the upstream and downstream transect locations were to provide a comparative assessment of the habitats in the area. The divers recorded onto slates at intervals along each transect, the depth, substrate, macrophytes present, suitability of the substrate as lamprey ammocoete habitat, fish spawning or nursery habitat, and the presence and abundance of biota including INNS. Further details are outlined in the full reports in EIAR Appendix A8.17 (Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2017)), EIAR Appendix A8.18 (Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2019)), EIAR Appendix A8.19 (Aquatic Invasive Species Survey Report, and EIAR Appendix A8.23 (Aquatic Invasive Species and Macrophyte Survey at Lough Derg and Parteen Basin).

104. Fish stock surveys were carried out within Lough Derg and Parteen Basin in June and July 2016. These surveys were carried out by IFI as part of their National Research Survey Programme (Kelly *et al.* 2017a; 2017b). Fish stock surveys were carried out in accordance with European standard protocols (CEN 2005). A multi-method fish stock survey was undertaken on Parteen Basin over two nights between 29 June and 1 July 2016 and on Lough Derg over eleven nights between 13 June and 5 July 2016. Three netting protocols (WFD+, eight panel braided, and pelagic survey gillnetting) were used alongside a hydroacoustic survey of the pelagic zone to provide a comprehensive picture of the fish community. Further details are outlined in the full reports in EIAR Appendix A8.15 (National Research Programme Lakes: Parteen Basin (Lower Lough Derg), Inland Fisheries Ireland Report) and EIAR Appendix A8.16 (National Research Programme Lakes 2016: Lough Derg, Inland Fisheries Ireland Report). It should be noted, the need to repeat these surveys in subsequent years was reviewed and it was determined there was unlikely to be any significant change that would warrant a repeat survey, and furthermore, more precise and appropriate data for the assessment was subsequently obtained from the scuba surveys undertaken, most recently in August 2024 (as described herein).

105. Underwater noise measurements were sampled in Parteen Basin over two weeks in October 2021 to establish a baseline surrounding the proposed location for the RWI&PS. The measurements were taken on a survey using both an unattended, fixed-position, long-term monitor, and attended short-term monitoring using boat-based instrumentation. The attended and unattended measurements were undertaken concurrently. All monitoring was undertaken from a small boat. This was followed by consideration of the generation and propagation of noise underwater from potential piling methods, in addition to noise due to water pumps when the RWI&PS is operational. This information was used to assess the potential impact of each noise source on fish species in Parteen Basin (EIAR Appendix A8.20: Underwater Noise Modelling Report).

106. A benthic invertebrate survey was carried out at Parteen Basin in August 2016 to determine the baseline scenario. The methodology for the survey involved a sampling collection programme, sample analysis and reporting for 12 sites (PB1-PB12) in Parteen Basin. Three replicate 0.025m^2 grabs for faunal analysis were taken and analysed along with a fourth sample taken for grain size and organic carbon analysis (Loss on Ignition[5]). Biological identification was at least to family level or better whenever possible. Statistical analysis was carried out on the grab returns using PRIMER v.6 (Plymouth Routines in Ecological Research). Univariate statistics in the form of diversity indices were calculated. Numbers of species and numbers of individuals per sample were calculated and the following indices were computed:

    - Margalef's Species Richness Index, for the number of individuals and species (Species richness is a measure of the total number of species present for a given number of individuals. Richness ranges from 0 (low richness) to 12 (high richness))
    - Pielou's Evenness Index, to assess maximum possible diversity, which could be achieved if all species were equally abundant (Evenness is a measure of how evenly the individuals are distributed among different species. Evenness ranges from 0 (low evenness) to 1 (high evenness))

[5] Loss on ignition is a test used in inorganic analytical chemistry, particularly in the analysis of minerals.

- Shannon-Wiener Diversity Index, for the proportion of the total count accounted for by the taxa (The diversity index incorporates both of the above parameters. Diversity ranges from 0 (low diversity) to 5 (high diversity)).

107. It should be noted, the need to repeat the 2016 benthic survey in subsequent years was reviewed and it was determined more precise and appropriate data for the assessment was subsequently obtained from the scuba surveys undertaken, most recently in August 2024 (as described herein).

108. Dedicated studies of zebra mussel (*Dreissena polymorpha*) were completed by the Lough Derg Science Group, supported by Uisce Éireann and Waterways Ireland, within Lough Derg and Parteen Basin, to investigate the distribution of zebra mussel in Parteen Basin. These studies included:

- The zebra mussel in the Parteen Reservoir and Lower Lough Derg (July 2016) (Minchin 2016)
- Zebra mussel larval abundance above the Parteen Reservoir during 2017 (Minchin and Boelens 2017).

109. In addition, in June 2021, a basket dredge survey was carried out in lower Lough Derg to determine the presence of INNS including Asian clam (*Corbicula fluminea*), as well as a basket dredge and scuba survey in Parteen Basin at the RWI&PS site, with further dredges at intervals in the basin between the RWI&PS site and the narrows at Ballina/Killaloe (EIAR Appendix A8.19: Aquatic Invasive Species Survey Report). This survey was repeated in August 2024 in order to update the baseline data (EIAR Appendix A8.23: Aquatic Invasive Species and Macrophyte Survey at Lough Derg and Parteen Basin).

- The first survey in June 2021 was focused on the lower section of Lough Derg from south of Rinnaman Point to within approximately 200m of the Ballina/Killaloe Bridge. A number of dredges were carried out at a series of locations and depths along a transect from the open lake to the narrows. A 4.5m RIB was used as the survey vessel. Samples were sifted in the water before hauling aboard to remove fine sediments. Samples were then sorted though in small amounts to check for presence of Asian clam, the juveniles of which can be as small as 2mm in length. The basket dredge was made using a Sunnex® stainless steel wire meshed basket of 260mm open diameter, 300mm height and 180mm bottom diameter. All basket surfaces, and the base, had a diagonal mesh of 5mm
- The second survey in June 2021 involved sampling using the dredge within the footprint of the RWI&PS, and at intervals between the RWI&PS and the narrows downstream of the Ballina/Killaloe Bridge. The locations of dredge surveys are shown in EIAR Appendix A8.19 (Aquatic Invasive Species Survey (June 2021)). In addition, a scuba survey was undertaken at the intake location which allowed for a visual assessment of the substrates and associated biota, and allowed for the collection of further sediments for sieving within the support vessel to determine presence of juvenile clams.

110. In August 2024, three survey methods were employed to determine the presence of INNS:

- A grapnel (hook) was used for sampling starry stonewort (*Nitellopsis obtuse*)
- A scraper (4m pole with a 15cm blade) was used to sample vertical surfaces for mussel growth
- A basket dredge (as described herein) was used to collect mussels from sediments to determine whether the Asian clam has extended its range southwards in Lough Derg from its current known distribution at the northern end of the lake.

2.5.1.7 Vertigo Surveys

111. A survey for the presence of the Habitats Directive Annex II listed whorl snail (*Vertigo* spp.) was undertaken in July 2020. The study area for this survey comprised six wetland areas along the Proposed Project and previous iterations of the project: Derrycrib, County Kildare and Raheenduff, Annaghmore, Coolfin Glebe, Pass and Derrinclare, County Offaly (i.e. where habitat was found that was deemed to have potential to support any of the three *Vertigo* species; EIAR Appendix A8.11: Vertigo Survey Report

(July 2020)). Surveys were not repeated at these sites as no suitable habitat was found, and/or no signs of the target *Vertigo* species.

112. The sampling methodology followed that used in the National Vertigo Monitoring Project (Brophy and Long 2019; Moorkens & Killeen 2011). An initial habitat suitability survey for all three species was carried out at each of the six wetland sites. An assessment of habitat suitability for supporting each of the target *Vertigo* species was made based on the vegetation present and the wetness levels at the time of survey, as well as the percentage area that could support the snail.

113. Where habitat was found that was deemed to have potential to support any of the three *Vertigo* species, samples were taken following the method appropriate to the species. For *V. moulinsiana*, the most suitable vegetation found within the study area was sampled by shaking it over a white tray. At each sample location, three adjacent patches of vegetation were sampled, and these were treated as a single sample. Any whorl snails that were collected in the tray were transferred to labelled glass vials and returned to the laboratory for confirmation. For *V. angustior* and *V. geyeri*, litter was collected from the appropriate habitat into three-litre muslin bags. These sample bags were labelled internally and returned to the laboratory to be dried. Once dried, the samples were sieved over nested sieves (0.5mm and 1.0mm) and a white tray, and each retained fraction searched for the target species.

114. A handheld computer and GPS (Nomad Trimble) running ArcPad 8.0 was used to navigate within the survey area and to record data in the field.

2.5.2 Hydrological Surveys, Monitoring and Modelling

115. Hydrological surveys including water quantity and quality monitoring, as outlined herein, were undertaken to inform the Screening Report as the Proposed Project crosses catchments that drain to European sites. These catchments include the Lower Shannon, Barrow, Boyne, and Liffey and Dublin Bay which drain into the following SACs/SPAs: Lower River Shannon SAC, Lough Derg North East Shore SAC, Charleville Wood SAC, Sharavogue Bog SAC, Rye Water/Carton SAC, Lisduff Fen SAC, River Barrow and River Nore SAC, River Shannon Callows SAC, South Dublin Bay SAC, River Boyne and River Blackwater SAC and SPA, Lough Derg (Shannon) SPA, Dovegrove Callows SPA, Middle Shannon Callows SPA, and South Dublin Bay and River Tolka Estuary SPA.

116. The hydrological study included both a desktop study and field surveys. The desktop study included consultation with relevant regulatory bodies, a review of published hydrological literature, aerial photography, and topographical and hydrometric information related to water bodies within the ZoI of the Proposed Project (i.e. the area in which an activity could directly or indirectly impact the environment; see Section 2.2). Field surveys undertaken included a walkover survey and surface water quality monitoring.

2.5.2.1 Walkover Surveys

117. A number of walkover surveys were completed between 2016 and 2025 to gain an understanding of the hydrological environment within the study area of the Proposed Project and previous iterations of the project:

- Surface water site walkover (October 2016):
  - Visual inspections were carried out 200m either side of the Planning Application Boundary of the RWI&PS on the bank of Parteen Basin. This distance is considered to adequately cover the extent of the proposed infrastructure with an additional 50m to 100m buffer
  - Visual inspections of surface water receptors crossed by the Treated Water Pipeline which included data on channel morphology and the riparian corridor

- Surface water walkover survey (May 2017):
  - Visual inspection to determine baseline geomorphological characteristics, including data on the channel cross-section, bed material, morphological features and riparian corridor
- Watercourse crossing inspection and sampling (June 2021):
  - Visual inspections and collection of water quality samples at selected crossing and abstraction locations. Additional visual inspections at sites identified to be potentially at risk or where new permanent infrastructure is proposed e.g. outfalls for Washouts
- Watercourse crossing inspection and sampling (November 2021):
  - Collection of water quality samples at selected crossing and abstraction locations
- Site walkover Parteen Basin (January 2022):
  - Site walkover along the banks of Parteen Basin to confirm the route of the Kilmastulla_050 which is diverted along the eastern side of the reservoir.
- Watercourse sampling (November 2022):
  - Collection of water quality samples at selected crossing and abstraction (for commissioning) locations
- Watercourse sampling (June 2023):
  - Collection of water quality samples at selected crossing and abstraction (for commissioning) locations
- Watercourse crossing and permanent Washout locations visual inspection (October 2024):
  - Visual observation of site character for these locations, ground cover, substrate and watercourse morphology
- Watercourse sampling (November 2024):
  - Collection of water quality samples at selected crossing and abstraction (for commissioning) locations
- Watercourse sampling (June 2025):
  - Collection of water quality samples at selected crossing and abstraction (for commissioning) locations.

2.5.2.2 Baseline Surface Water Quality Monitoring: Lough Derg and Parteen Basin

118. Ongoing baseline water quality monitoring commenced in May 2015 at Lough Derg and Parteen Basin, with a series of temporary monitoring stations installed on the Lake[6]. Locations of the monitoring stations have been provided in EIAR A09.1 Figure 2 in Appendix A9.1 Abstraction Assessment, of Chapter 9 (Water).

119. A variety of methods were employed to monitor the surface water environment of the Lake, as follows:
    - Continuous flow, water level, and current monitoring
    - Continuous water quality monitoring: Physicochemical water quality sampling buoys sampling for water temperature, conductivity, dissolved oxygen, pH, nitrates, nitrites, ammonia and phosphates (at near-surface, mid depth and near bed of water column), with additional surface sampling of turbidity and chlorophyll-a
    - Continuous temperature monitoring: Temperature sensors measuring the water column at varying depths

[6] Lough Derg and Parteen Basin together are referred to as the 'Lake'.

- Manual water quality spot sampling: Spot sampling from the surface of the river column at fortnightly intervals with laboratory analysis of BOD, chlorophyll-a, nitrates, nitrites, ammonia, phosphates, suspended solids and alkalinity
- Plankton surveys: monthly and fortnightly intervals for 112 months
- Meteorological monitoring.

120. Details of the hydrological and water quality monitoring for Lough Derg and Parteen Basin are provided in EIAR Appendix A9.1, of Chapter 9 (Water).

2.5.2.3 Baseline Surface Water Quality Monitoring: Construction Working Width

121. As the Proposed Project is a linear development, similar to that of a road scheme, baseline surface water quality monitoring was undertaken in line with the NRA Guidelines (NRA 2008a) in October 2016, May 2017, June and November 2021, November 2022, June 2023, November 2024, and June 2025 for the Proposed Project and previous iterations of the project. A summary of the numbers of samples taken on each occasion is provided in Table 2.6. On each occasion, several of the identified watercourses could not be sampled because they were either dry or there were restrictions to land access. This, however, did not impair the overall assessment or conclusions; the samples are 'snapshots' of the water quality and whilst informative, they are not critical to the assessment. In the absence of sample data, EPA data were used where available. If not available, an estimate of risk to the watercourse was made based upon other factors such as size of the watercourse, proximity to urban areas or agricultural land, and presence of wastewater treatment works.

Table 2.6: River Water Quality Monitoring

Date of Sampling	Number of Samples Taken
October 2016	32
May 2017	53
June 2021	29
November 2021	31
November 2022	30
June 2023	27
November 2024	25
June 2025	29

122. The locations of water quality sampling points are presented in EIAR A09.2 Figures 1-59 in EIAR Appendix A9.2 (Pipeline Assessment), and EIAR Appendix A9.6 (Laboratory Analysis and In Situ Results) provides the results of the laboratory analyses of the samples taken.

2.5.2.4 Water Quality Modelling

123. A water quality model of Lough Derg and Parteen Basin (the Lake) was constructed to simulate the existing relationship between Lake levels, flows, and water quality in order to carry out modelling to determine if the proposed abstraction would impact on the water quality of Lough Derg and Parteen Basin. The model was calibrated using water quality monitoring data collected in 2016 and in 2018 as part of the Lough Derg Monitoring Project (Annex D of EIAR Appendix A9.1: Abstraction Assessment). It was also informed by a hydrographic survey of Lough Derg, undertaken in 2015 (Annex E of EIAR Appendix A9.1: Abstraction Assessment).

124. The final calibrated hydrodynamic and water quality modelling provided the following:

- Determination of physical processes and hydrodynamics of Lough Derg and Parteen Basin, including an understanding of how flow rates are impacted by circulation
- Predictions of water quality, and how this varies with flow and circulation
- Assessment of how the proposed abstraction would affect the water quality of the water bodies for a representative range of climatic conditions including climate change scenarios.

125. The assessment of potential impacts on water quality using the model are summarised in EIAR Appendix A9.1 (Abstraction Assessment).

2.5.3 Hydrogeological and Geotechnical Surveys

126. A hydrogeological study was undertaken to inform the NIS. The hydrogeological study included both a desk review and hydrogeological monitoring/GI. The GI work included boreholes, trial pits, and geophysical surveys. The full hydrogeological survey methodology used to gather hydrogeological data for the full extent of the Proposed Project (including the locations of the GI works) is provided in Chapter 10 (Soils, Geology and Hydrogeology) in the EIAR.

127. Ground investigations were undertaken in two main phases spanning the period May 2017 to January 2024. Phase 1 of the GI was undertaken by Integrated Global Solutions Limited between May 2017 and December 2017 for previous iterations of the project. The information collected remains valid and relevant for the purposes of assessing adverse effects on the integrity of European sites as a result of the Proposed Project alone or in-combination with other plans and projects. One hundred and thirty cable percussion (Shell & Auger) boreholes were completed using Dando 2000 Cable Percussive Boring Rigs. Sixty-one rotary core boreholes were carried out to establish overburden conditions and rockhead and to establish the nature and integrity of the underlying rock. Four trial pits were excavated in 2017 using a 13 tonne wide-padded tracked excavator or JCB excavator. This site investigation was carried out to provide detailed factual geotechnical information of the underlying ground conditions within the study area of the Proposed Project, in order to assess potential impacts from construction methodologies for the preparation of the AA. Depth of peat data were available from the GI, field surveys and data from Bord na Móna. Results are included in EIAR Appendix A10.1 (2018 Ground Investigations). The GI data were supplemented by site walkovers and roadside surveys, GSI data, orthophotography and professional judgement. Where GIs were undertaken, subsoil deposits and selected exposures/sections were logged according to BS 5930:2015 +A1:2020.

128. The 2018 borehole locations were focused on the RWI&PS, WTP, BPT, BPS infrastructure sites and river, rail and road crossings, as well as areas identified as shallow rock on the GSI datasets. The main river crossings were identified for site investigation including the Nenagh, Ballyfinboy, Little Brosna, Silver, Figile, Daingean, Clodiagh and River Liffey crossings. Boreholes were drilled either side of the two M7 road crossings (BH004 and BH005 at Chainage TW – 5520; BH006 and BH007 at Chainage TW – 13100) and the two Grand Canal crossing points (BH032 and BH033 at Chainage TWD – 15000; BH038 and BH039 at Chainage TWE – 14150) (EIAR Appendix A10.1).

129. Phase 2 GI works were undertaken between November 2021 and January 2024 as part of the Proposed Project with the majority of GI undertaken in 2022. Ground investigation works were undertaken by Priority Geotechnical Limited, Causeway Geotech Limited, Irish Drilling Limited, and Integrated Global Solutions Limited under the supervision of Mott MacDonald, acting as the employer's representative on behalf of Uisce Éireann.

130. Phase 2 GI was divided into separate lots. Lot 1 comprised the RWI&PS, RWRM, WTP and the Treated Water Pipeline from the WTP to the BPT. Lot 2 comprised the BPT, BPS and the Treated Water Pipeline between the BPT and Chainage TWC – 10200. Lot 3 comprised the Treated Water Pipeline between Chainage TWC – 10200, FCV, and the TPR. A summary of the number of boreholes and trial pits

installed for the GI survey is shown in Table 2.7. Borehole logs and trial pitting data are included in EIAR Appendix A10.4 to Appendix 10.14 (2022 and 2023 Ground Investigations).

Table 2.7: Site Investigation for the Proposed Project

Targeted Areas	Number of Boreholes[7] (2018)	Number of Boreholes (2022)	Trial Pits (2022)	Peat Probes (2022)
RWRMs, Treated Water Pipeline	135	-	-	-
Lot1 – RWRM and Treated Water Pipeline from the WTP to the BPT	-	118	137	46
Pipeline Lot 2	-	199	462	444
Pipeline Lot 3	-	165	245	999
RWI&PS	2	8	-	
WTP	3	167	95	-
BPT	2	31	41	-
BPS	2	12	24	-
TPR	2	27	36	-
Total	**146[8]**	**727**	**1,040**	**1,489**

131. Geophysical surveys, consisting of ground conductivity, 2D-Resistivity and seismic refraction (p-wave) surveying were carried out in 2018 for previous iterations of the project in the Ardcrony/Ballythomas area, County Tipperary and at 22 river crossings along the Treated Water Pipeline (see EIAR Appendix A10.1: 2018 Ground Investigations). The information collected remains valid and relevant for the purposes of assessing adverse effects on the integrity of European sites as a result of the Proposed Project, individually or in-combination with other plans and projects. The main objectives of the geophysical survey were to establish the ground conditions in the Ardcrony/Ballythomas area, the depth to rock and the overburden thickness, to estimate the strength/stiffness/compaction of overburden and the rock quality, to establish the presence of faults and fracture zones and possible karstified rock.

132. A total of 74 geophysical survey lines were undertaken for the Proposed Project in 2022, consisting of ground conductivity, 2D-Resistivity and seismic refraction (p-wave) surveying focusing on the RWI&PS, BPT and along the Treated Water Pipeline (see EIAR Appendix A10.4 to Appendix A10.14 (2022 and 2023 Ground Investigations)).

2.5.4 Limitations

133. The main difficulty encountered compiling information during the preparation of this NIS was restricted land access or inaccessible areas to undertake baseline surveys.

134. 'No access' lands are lands within the study area where no access permission was granted by the landowner for the surveyors, where no contact was made with the landowner (i.e. landowner contact details were unknown/could not be obtained), or where the presence of dense vegetation/scrub cover made areas inaccessible. Due to access restrictions, the overall area of land within the study area of the Proposed Project not surveyed in the field, once all surveys (undertaken between 2016 and 2025) were complete, was 12.5% of which 3.3% were residential properties.

135. In accordance with best practice guidelines (CIEEM 2018), in the worst-case scenario, 'no access' lands were surveyed and visually assessed from adjacent lands and/or from public roads using binoculars, where possible, and were supported by information obtained from a review of aerial photography, LiDAR

[7] Borehole comprised Cable Percussion, Rotary Boreholes, Dynamic probes, Geobore-S.

[8] Four trial pits undertaken in 2018

and oblique imagery, and desktop study data. With regard to watercourse crossings, where access was not permitted a precautionary approach was taken and an assessment was made based on information extrapolated from the surrounding environment as well as desktop study information.

136. In addition, to overcome the difficulties with limited land access, and to ensure that appropriately robust appraisals were undertaken, a precautionary approach was adopted in the design of the Proposed Project. In situations where the Proposed Project was constrained to areas with no access, LiDAR and oblique imagery, GIS datasets, and desktop study information were used to select a route of likely local importance (lower value) thereby minimising the potential for impacts of significance associated with the Proposed Project. Pre-construction surveys will also be undertaken prior to the commencement of any works in order to identify any changes from the original baseline surveys and to ensure adequate mitigation measures are put in place.

137. Notwithstanding the difficulty regarding 'no access' lands, a comprehensive description of the baseline biodiversity of the study area, likely to be impacted by the Proposed Project is presented herein. The inaccessible areas have been considered in determining the impact significance and are reflected in the mitigation strategy. Sufficient data were gathered to reliably inform the impact assessment despite not being able to fully access these areas.

138. Over the years a number of surveys had to be cancelled or rescheduled for various reasons such as the COVID-19 pandemic and unsuitable weather conditions. However, this is not considered to be a limitation as surveys were rescheduled for subsequent days/months/years.

139. With regard to surveying for aquatic macroinvertebrates at the Proposed Project watercourse crossings, the optimum period is in the spring or autumn as during the summer some species may have emerged as adults and the remaining nymphs may be early instars which are small and difficult to identify. However, the life histories of the various species are well understood (Kelly-Quinn and Reynolds 2020) and taking the season into account an experienced aquatic ecologist can adequately interpret community composition data collected at the time of the surveys; therefore, surveys undertaken during the summer months, rather than spring or autumn, are still considered robust and the mentioned limitation is not considered to curtail the assessment.

140. In wadable watercourses, the chosen method for macroinvertebrate sampling was kick sampling. In non-wadable watercourses where kick sampling was not possible, other techniques, such as dredge sampling from a boat, were not considered practical due to locations and limited access. However, many of the non-wadable, wider, deeper watercourses would be crossed by trenchless excavation which would avoid directly impacting the watercourse and therefore, the need to survey aquatic macroinvertebrates at these sites was scoped out. For non-wadable watercourses that would be crossed by open cut trench excavation rather than trenchless excavation, a visual assessment was undertaken, and a precautionary approach was followed with regard to macroinvertebrates assemblage and fisheries potential. These sites have been considered in determining the impact significance and are reflected in the mitigation strategy. Sufficient data were gathered to reliably inform the impact assessment despite not being able to fully survey these areas.

141. The information that has informed the assessment is sufficient to identify the likely adverse effects. The limitations described in this report are not considered to have a material impact on the assessment conclusions because of the reasons stated above.

2.6 Assessment Methodology

142. The approach identified and assessed the implications of the Proposed Project for European sites in view of their conservation objectives, specifically in terms of whether it would adversely affect the integrity of any of the European sites outlined below, either individually or in-combination with other plans and projects.

143. The Proposed Project (including the proposed design, construction methodologies and operational effects) was analysed and assessed to identify the associated potential impacts that could affect the ecological environment. From this, the ZoI of the Proposed Project was defined (as is set out in detail in Section 2.2). Based on the identified impacts, and their ZoI, the European sites potentially at risk of any direct, indirect, or in-combination effects, were identified. This assessment was undertaken in consideration of all potential impact sources and pathways connecting the Proposed Project to European sites, in view of the conservation objectives of those sites.

144. The conservation objectives relating to each European site and its qualifying interests/special conservation interest species are expressed generally for SACs as, to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected; and for SPAs as, to maintain or restore the favourable conservation condition of the bird species and wetlands listed as special conservation interests for which the SPA has been selected.

145. Following from this, and as defined in the Habitats Directive, favourable conservation status (or condition, at a site level) of a habitat is achieved when:

- Its natural range, and area it covers within that range, are stable or increasing
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future
- The conservation status of its typical species is favourable.

146. The favourable conservation status (or condition, at a site level) of a species is achieved when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future
- There is, and would probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

147. Site-specific conservation objectives for European sites include a series of specific attributes and targets against which effects on conservation condition, or integrity, can be measured, i.e. an impact which affects the achievement of favourable conservation condition, as measured by the attributes and targets, would be an adverse effect on the integrity of the European site.

148. In the case of some qualifying interests/special conservation interest species in certain European sites, the conservation objective is to restore rather than maintain conservation condition and this distinction is taken into account in the assessment, as is any legacy damage to European sites that has occurred since their designation, insofar as possible.

149. To the extent that the assessment carried out as part of the preparation of this NIS found that the Proposed Project has the potential to impact on European sites, avoidance and mitigation measures have been included to ensure that beyond reasonable scientific doubt, the Proposed Project, alone or in-combination with other plans and projects, would not adversely affect the integrity of the sites in respect of their conservation objectives.

150. The assessment process is summarised in Diagram 2.1:

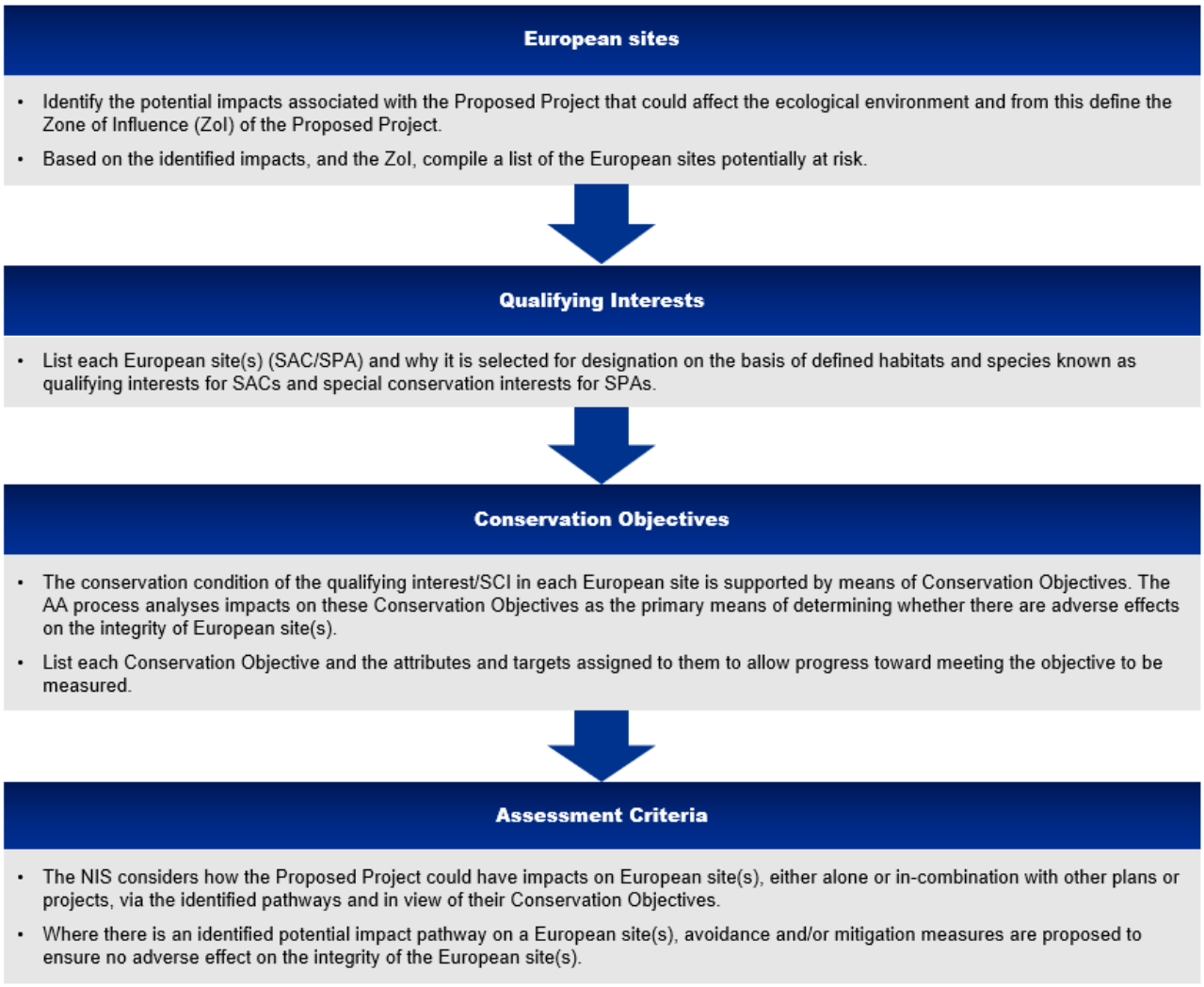


Diagram 2.1: Appropriate Assessment Process

2.6.1 Construction Flexibility

151. At this stage of the development of the Proposed Project there are a number of points of detail which cannot be finalised. This is due to factors such as unknown site constraints or obstacles that may affect the construction of the permanent infrastructure. Although a high level of ground investigation has been obtained to inform the planning application for the Proposed Project, further site investigations will be undertaken following grant of planning permission. This will inform a confirmed design for construction. This is a standard delivery approach and as a result, for a linear project of this nature, scale and complexity, it is typical that a level of construction flexibility is required. This flexibility in construction is necessary to provide a mechanism to overcome these matters during the later stages of the Proposed Project.

152. The construction works necessary to deliver the permanent design (including the construction flexibility) would take place within the Construction Working Width which defines the extent of the Planning Application Boundary. For the assessment reported in this EIAR this means that the construction works could take place anywhere within the Construction Working Width.

153. The assessment reported herein has taken account of this construction flexibility and assessed all likely significant effects on European sites alone and/or in-combination with other plans or projects that could arise within this defined construction flexibility (as set out below). For this assessment, the likely

significant effects alone and/or in-combination with other plans or projects reported herein would not change regardless of the alignment or location of infrastructure elements within the defined construction flexibility (i.e. the difference in effects would be imperceptible for the purpose of the assessment).

- Treated Water Pipeline and RWRMs horizontal alignment – to allow for construction flexibility to overcome site constraints or obstacles the pipeline could be anywhere within a 20m Pipeline Corridor as defined in Chapter 4 (Proposed Project Description) of the EIAR. The assessment has identified the likely significant effects on European sites alone and/or in-combination with other plans or projects from the closest point of the Proposed Project to the European site(s) (i.e. the Planning Application Boundary). The likely significant effects on European site(s), assessed herein, would not change regardless of the location of the pipeline within the 20m Pipeline Corridor
- Treated Water Pipeline vertical alignment – to allow construction flexibility to overcome site constraints or obstacles, the vertical alignment of the pipeline could vary between 1.2m and 4.4m to the crown of the pipe. Exceptions would be at proposed trenchless crossing locations (which due to the construction approach would be deeper than 4.4m to crown) and where it has been identified that for hydraulic purposes, the crown of the pipeline would need to be deeper than 4.4m. These have been included in the vertical alignment set out in the Planning Application for the Proposed Project. In these instances, the construction flexibility would be the crown of the pipe not being deeper than that shown in the Planning Application Drawings and not shallower than 1.2m. The excavation needed for the pipeline is assumed to be the largest needed for the lowest vertical parameter set out. The assessment has identified the likely significant effects on European sites alone and/or in-combination with other plans or projects from the vertical alignment within this defined flexibility. The likely significant effects on European sites, assessed herein, would not change regardless of the vertical alignment
- The location of valves, and associated pipeline features, that need to be above the pipeline could change if there is a change in the vertical or horizontal alignment of the pipeline, as a result of the construction flexibility defined above. The construction flexibility would allow them to move within the 20m Pipeline Corridor. However, the location of these pipeline features would be limited to remaining within the land parcels as identified and assessed within the EIAR and herein (but still remaining within the 20m Pipeline Corridor). The assessment has identified the likely significant effects on European sites alone and/or in-combination with other plans or projects from the valves being located within this defined flexibility. The likely significant effects on European sites, assessed herein, would not change regardless of the valve locations
- To construct the smaller connection pipes between washout valves and washout outfalls, a small amount of construction flexibility would be required to overcome onsite obstacles or constraints. To allow for this, the connecting pipe could be anywhere within a 10m corridor. The assessment has identified the likely significant effects on European sites alone and/or in-combination with other plans or projects from the outfall connections being within the 10m corridor. The likely significant effects on European sites, assessed herein, would not change regardless of the outfall connection locations
- The outfall headwalls and discharge point would have to move with the alignment of the outfall pipeline, as set out above, and so the discharge point could move within the same 10m construction flexibility. To allow for the headwalls to move 10m either side of the current pipeline alignment, a total construction flexibility width of 20m has been allowed for the headwalls. The assessment has identified the likely significant effects on European sites alone and/or in-combination with other plans or projects from the outfalls being located within this defined flexibility. The likely significant effects on European sites, assessed herein, would not change regardless of the outfall locations.

2.7 Consultations

154. Consultations were carried out with various bodies at each stage of the Proposed Project. This included consultation on previous iterations of the project, which fed into the design development and assessment of the Proposed Project. Consultations undertaken in relation to the NIS and potential impacts on qualifying interests/special conservation interest species, are summarised below. Consultation feedback

on previous iterations of the project is included below where relevant and appropriate to the Proposed Project.

2.7.1 National Parks and Wildlife Service

155. A consultation response (Reference: G2008/957; Appendix B: NPWS and DEHLG Correspondence) received from the DEHLG in 2009 (now the DHLGH), noted '*the preferred option will require an Article 6(3) appropriate assessment as part of the application for consent, either as part of the EIS or as a separate report. Abstraction…from a Natura 2000 site with water-related conservation interests would present a risk of a significant effect on such a site and its conservation objectives, meaning that a full or stage two assessment would be required*'. Regarding the Proposed Project (or Option C at the time), the same consultation response noted that the Habitats Directive Assessment (RPS Consulting Engineers 2008b; Appendix C: SEA Phase 2 Report) undertaken at the time concluded:

156. Option C will not adversely affect the integrity of the site, if the hydrological regime of the Shannon is maintained according to the listed mitigation measures:

- Design of the abstraction structure to reduce or remove the risk of entrainment and/or impingement of fish species migrating past the intake point. However, confirmation of the engineering feasibility of this design in relevant conditions in Parteen Basin is necessary before there is no reasonable scientific doubt that the abstraction will not adversely affect the integrity of the site (Response/Reference: see Section)
- The hydrological model developed for the Proposed Project demonstrates there to be no change in forward flows down the Old River Shannon below Parteen Weir from the inclusion of the Proposed Project abstraction. Furthermore, the proportion of days when the Old River Shannon is receiving just the minimum compensation and fish pass flows is predicted to be unchanged by the inclusion of the Proposed Project, as does the timing of the spill flows down the Old River Shannon when Ardnacrusha is at full capacity (Response/Reference: see Section 7.1.3.2).

157. These issues raised by NPWS have been addressed in Section 3.5 and Section 7.1.4.

158. On 22 February 2017, 14 December 2023, and 31 January 2025 submissions were received from the Development Applications Unit (DAU) on behalf of the Department of Culture, Heritage and the Gaeltacht (DCHG) and the DHLGH, respectively; Appendix D: DAU Consultation). In these submissions, the DAU outlined heritage-related observations and/or recommendations. In particular, the DAU advised the applicant of the following (*inter alia*):

- The applicant should be cognisant of changes in the interpretation and application of directives and national legislation arising from jurisprudence of the European and Irish courts, particularly in respect of Article 6 of the Habitats Directive (see Section 1 and Section 2.6)
- Determining the extent of the receiving environment, 'study area' or 'Zone of Influence' for surveys, assessment and analysis will require particular attention for a project of this nature and scale. In addition to direct and indirect effects, cumulative and in-combination effects should inform such considerations and associated analysis from the outset. The water quality model will be needed to inform the EIAR and NIS, and the identification of the 'Zone of Influence' (see Section 2.2 and Section 6)
- Consideration should be given to whether there is potential for reduced flows over longer periods, or reduced flushing in the channel downstream of Parteen Basin, to occur and impact sedimentation rates and allow encroachment by trees, alluvial woodland and other wetland habitats to occur. The impacts on any tributaries of the Shannon system should also be assessed in the NIS (see Section 3.5.11 and Section 7.1.3.2)
- Invasive non-native species should be surveyed to establish the current baseline and to develop a strategy and mitigation measures for their treatment, control, and monitoring before, during and after the Construction Phase (see Section 2.5.1.2, Section 2.5.1.6, and Section 3.5.7)

- A critical ecological concern is the potential impact of the proposed water abstraction during drought periods and adverse water level impacts on the Lower River Shannon SAC and the upstream River Shannon Callows SAC. How will water levels will be managed in such circumstances and can the extended period of reduced flow (above 10m^3/sec at Parteen Weir) be modelled. Can it be verified that the maximum rate of abstraction is not exceeded during a drought (see Section 3.5.11 and Section 7.1.3.2)
- Demonstrate that the design of the intake screens delivers at a flow rate of 0.15m^3/s (see Section 3.5.5 and Section 7.1.4.7)
- Will there be a requirement for screen cleaning and intake pipe anti-fouling (see Section 3.8.1 and Section 7.1.4.5)
- Ecological impacts resulting from the intake structure including fish mortality and effects of noise (see Section 5, Section 7.1.4.6 and Section 7.1.4.7)
- Survey data on the movement of otters upstream and downstream of Parteen Weir (see Section 4.3.1.2)
- Baseline data to show whether or not wintering wildfowl from Lough Derg are using Parteen Basin (see Section 4.3.1.2)
- The need for a comprehensive ecological survey approach (see Section 2.5)
- A detailed hydrodynamic and water quality model will be necessary to inform the assessment and analysis in the NIS and to support the conclusions reached. The findings and predictions in relation to hydrological, hydraulic and water quality impacts will need to be fully integrated with the ecological assessment and analysis in the NIS (see Section 3.5.11 and Section 7.1.3.2)
- There is also a likelihood of in-combination effects arising notably from flood relief and drainage activities on the Lower Shannon system (see Section 8)
- Concerns related to discharges from the WTP to the Kilmastulla River (which is part of the Lower River Shannon SAC) (see Section 3.3.3, Section 3.5.8 and Section 3.5.9).

159. In addition to written correspondence, meetings were held with the NPWS's Divisional Ecologists on 16 April 2014, 21 October 2014, 7 December 2015, 25 August 2016, 25 April 2019, 10 April 2024 and 23 April 2025 regarding ongoing design development, the scope of the ecological field survey work, existing records of rare and protected species and the likely significant effects of the Proposed Project alone or in-combination with other plans and projects. The key advice received from NPWS included that, in its opinion:

    - A NIS would be required for the Proposed Project and that NIS needed to clearly assess the significance of the effects on European sites based on objective and scientific information, be well-referenced and substantiated, and address the issue of in-combination effects (particularly abstractions from the River Shannon) and alternatives
    - In relation to the proposed abstraction, scientific modelling of the hydrological regime would be required to assess the ecological effect of extreme conditions (presumably extreme drought and flood conditions), with climate change impacts also to be taken into consideration (see Section 3.5.11 and Section 7.1.3.2)
    - In designing survey methodologies, qualifying interests and their conservation objectives need to be considered (see Section 2.5, Section 6, and Section 7)
    - There is a need to have regard for the legal definition of NIS, particularly the requirement for it to contain the scientific evidence and data necessary to support the assessment of likely significant effects of the project on European sites in view of their conservation objectives, and conclusions reached. The NIS should include any environmental data necessary to assess implications for the conservation objectives of a site, including aspects of structure and function of habitats. The modelling supporting the assessment of hydrological effects on sites that could be affected by abstraction, whether at, or upstream or downstream of Parteen Basin, should be integrated into the NIS (see Section 3.5.11 and Section 7.1.3.2)

- The test (AA test) should be against the conservation objectives, not just based on source-pathway-receptor model. Reliance should not be based on a 15km distance (see Section 2.2 and Section 6)
- Consideration should be given to Sustainable Urban Drainage Systems (SuDS), particularly in relation to any discharges to watercourses or along Haul Roads to construction compounds (see Section 3).

2.7.2 Inland Fisheries Ireland

160. Inland Fisheries Ireland was consulted throughout each stage of the Proposed Project and its previous iterations, particularly regarding the proposed RWI&PS and watercourse crossings.

161. A meeting with IFI was held on 8 December 2014 to discuss the various options at that time and to provide a project update. This was followed by a meeting on 19 October 2015 regarding the Preliminary Options Appraisal Report (POAR) and development of a 'Least Constrained Pipeline Corridor'. The IFI noted:

- IFI has preferred engineering approaches to river and stream crossings (Note: IFI (2016) guidelines have been considered in the design of the watercourse crossings and associated mitigation measures (Section 7.1.4))
- Relevant and appropriate protocols for the control of INNS in any construction works must be observed (see Section 7.1.4.3 and Section 7.1.4.5)
- A fish stock survey of Parteen Basin would be beneficial to the impact assessment (see Section 2.5.1.6).

162. A meeting was held on 3 March 2016 to update the IFI on the status of the then current iteration of the project. Discussions undertaken included the ESB management regime at Parteen Basin and relevant infrastructure associated with Ardnacrusha generating station. Protected species including the aquatic qualifying interests of the Lower River Shannon SAC and INNS were also discussed.

163. Subsequently, on 10 March 2016 a letter was received from IFI (Appendix E: IFI Correspondence). In this letter, IFI outlined the following:

- Instream works (in fisheries waters) to take place only during July-September in any year and be completed before 30 September in any year (see Section 7.1.4.8)
- Movement/transfer of INNS to any other water body and any other River Basin must be prevented (see Section 7.1.4.5)
- Planned maximum water abstraction figure must ensure that all life stages of INNS which may gain admission to the treatment works, are destroyed (see Section 7.1.4.5)
- Grand Canal crossing by directional drilling should be considered (see EIAR Appendix A8.14: Watercourse Crossing Data)
- Construction Management Plan should include topsoil stripping, hedge removal and biosecurity issues (see EIAR Appendix A5.1: Construction Environmental Management Plan)
- Watercourse crossing points should minimise potential impacts on fisheries waters particularly in relation to spawning and nursery areas
- Intake structure must include screening arrangements to prevent admission of any fish species (see Section 3.5.3 and Section 3.5.5)
- Micro tunnelling/directional drilling is recommended for a number of river courses to prevent disruption to aquatic habitats (see EIAR Appendix A8.14: Watercourse Crossing Data)
- All water crossing points must be agreed in advance with IFI. Where fish removal is required to facilitate these crossings, this work must be carried out by qualified personnel authorised by the relevant Minister under the Fisheries Acts 1959 to 2010

- Where a watercourse has a steep gradient the use of pipe crossings may not be adequate to facilitate the free movement of fish and this type of steep gradient crossing will require a temporary clear span bridge.

164. On 30 May 2016, IFI submitted a formal response to the 'EIS Draft Scoping Report', and on 4 March 2025 a response to the non-statutory consultation (Appendix E: IFI Correspondence), noting the following:

- Uisce Éireann should consider the WFD and impacts on water quality, quantity, ecology and hydrology (see Water Status Impact Assessment, submitted with the Strategic Infrastructure Development application)
- Impact of abstraction on assimilative capacity in the River Shannon downstream of the Parteen should be reviewed (see Section 3.5.11 and Section 7.1.3.2)
- Climate change should be accounted for in the modelling (see Section 3.5.11 and Section 7.1.3.2)
- Consideration of the abstraction scenario during drought conditions (see Section 3.5.11 and Section 7.1.3.2)
- The commitment to 10m^3 minimum flow down the Old River Shannon and the potential for a future EFlow regime for the Lower River Shannon Fish Passage plan to change this minimum flow should be considered (see Section 4.1.1.2)
- The effects of water level variation in rivers, lakes and tributary streams on trout and salmon spawning and the effects of lake level variation and effects on littoral zones must be fully investigated (see Section 4.1.1, EIAR Chapter 9 (Water), EIAR Appendix A9.1 Annex A (Hydrological Modelling Report), and EIAR Appendix A9.1 Annex B (Water Quality Modelling Report)
- Noise and vibration impacts on fish should also be considered (see Section 7.1.4.6)
- Electro-fishing/fisheries/surveys should be licensed by Department of Communications, Climate Action and Environment
- Water abstraction for dust suppression is an issue to be considered (see EIAR Chapter 5: Construction and Commissioning)
- Potential Operational Phase impacts (see Section 5.2)
- Impact of light on fish at abstraction (see Section 3.3.1)
- Impact to low lake levels (see Section 3.5.11 and Section 7.1.3.2)
- Pipeline cleaning and assessment of impact of zebra mussels (see Section 7.1.4.5)
- Number and location of river crossings (see EIAR Appendix A8.14: Watercourse Crossing Data)
- Temporary crossings to be addressed (see Section 5.1.2.1 and Section 7)
- Consideration of the disposal of waste such as sludge produced by the WTP (see Section 3.8.3)
- During testing and commissioning, the filling of pipes from local watercourses and discharging of these waters following testing should be considered (see Section 3.7.4.3)
- Impacts and mitigation of INNS (see Section 7.1.4.5).

165. Five more meetings were held with IFI, on 30 September 2016, 5 January 2017, 17 September 2019, 2 May 2024 and 30 June 2025. At these meetings IFI questioned if abstraction from Parteen Basin would reduce demand on the River Liffey, and the possible presence of zebra mussels (an INNS) in Parteen Basin was highlighted. Leakage was also considered, including progress with reducing customer-side leakage. Valves of different types and their expected spacing and operation were discussed, as well as the testing and commissioning phase, disinfection with chlorine, and pressure testing water volumes. Set back distances for trenchless crossings and 'breakout' risks of bentonite were considered, as well as compensation flows below Parteen, and ammonia release associated with drying peat.

2.7.3 BirdWatch Ireland

166. On 14 February 2017, a consultation response was received from BWI (Appendix F: BirdWatch Ireland Correspondence) noting their concerns related to the potential for impacts to birds and their habitats within the Lower River Shannon SAC and along the Construction Working Width. BirdWatch Ireland noted:

- The need for a full assessment of potential impacts resulting from the effects of the Proposed Project on water quality and quantity and on the water-dependent habitats and species protected under the Birds and Habitats Directives
- Any potential for impacts under Article 6(4) of the Habitats Directive should be planned well in advance to ensure that compensatory measures are put in place and functioning before any work is undertaken on the ground
- It will be imperative that the Proposed Project meets the requirements of Article 4(4) of the Birds Directive, that is that birds in the wider countryside, outside of SPAs, and in particular Annex I species, are not impacted. In particular hen harrier, breeding curlew (*Numenius arquata*) and migratory birds
- Ensure that there is an assessment of impacts to Red and Amber Listed Birds of Conservation Concern in Ireland, in particular breeding curlew. This is important to comply with Article 4(4) of the Birds Directive
- The need for comprehensive habitat surveying and mapping
- The need to assess the potential for impacts relating to soil compaction and drainage resulting from Construction Phase activities. Such activities could negatively affect breeding waders
- Cumulative impacts of this Proposed Project with other plans and projects will need to be assessed extremely carefully
- Every effort should be made to ensure there is a minimum take of mature hedgerow and scrub. Removal of this habitat type should not be conducted during the breeding bird season, 1 March to 31 August, as per Section 40 of the Wildlife Acts 1976 to 2012
- Strict biosecurity measures should be put in place to prevent the spread of INNS.

2.7.4 Irish Hen Harrier Winter Survey

167. In 2020, the Irish Hen Harrier Winter Survey group were contacted in relation to potential data on hen harrier winter roost locations. In September 2020, the consultee provided locations of potential and confirmed hen harrier roosts within the ZoI of a previous iteration of the project and VP locations used by the Irish Hen Harrier Winter Survey. The information provided was used to inform the site selection for hen harrier winter roost surveys during the 2020/2021 winter season. As previously mentioned, hen harrier activity continued to be monitored within the study areas between 2022 and 2024 during terrestrial ecology and breeding and wintering bird surveys, during which time hen harrier were rarely recorded and no potential winter roosts were identified. Therefore, hen harrier winter roost surveys were not repeated in subsequent years.

168. Project consultation is also discussed in Chapter 2 (The Environmental Impact Assessment Process) of the EIAR. All relevant consultation responses have been fully taken into account in preparing this NIS.

3. Description of Proposed Project

3.1 Overview

169. The Proposed Project is to abstract water from Parteen Basin on the Lower River Shannon, treat it to a potable standard, and to transfer the treated water along a 1.6m diameter pipeline approximately 172km long, through the Eastern and Midlands Region, ending in south County Dublin as shown in Figure 1.1. As previously noted (Section 1.1), the Proposed Project includes six infrastructure sites, three sections of pipeline (RWRMs, Treated Water Pipeline from the WTP to the BPT, and Treated Water Pipeline from the BPT to the TPR) and 38 kV Uprate Works as follows:

- A RWI&PS on the eastern shore of Parteen Basin in the townland of Garrynatineel, County Tipperary to facilitate a maximum abstraction of up to 300 (Million Litres per Day) Mld, during peak demand periods
- Approximately 2km of twin 1,500mm nominal diameter steel RWRMs, capable of transferring raw water up to a maximum throughput of 300Mld from the RWI&PS to the WTP
- A WTP in the townland of Incha Beg in County Tipperary, 2.6km north-east of the village of Birdhill
- A single steel pipeline of approximately 170km in length and 1,600mm in diameter to transfer up to 300Mld of treated water from the WTP to the TPR at Peamount, County Dublin. The TPR would have a capacity to store up to 75 megalitres (Ml) and provides the location for the Proposed Project to connect into the existing drinking water network
- A BPT in the townland of Knockanacree in County Tipperary, north of the town of Cloughjordan
- A BPS in the townland of Coagh Upper in County Offaly, approximately 30km downstream from the BPT
- A FCV south of Newtown in County Kildare, approximately 5km west of the TPR
- A TPR located adjacent to the existing reservoir site at Peamount, south-west County Dublin
- Power connections to the infrastructure sites including uprating of the existing Ardnacrusha – Birdhill 38 kV OHL to deliver adequate electrical power to the RWI&PS and the WTP, and providing a new connection from a sub-station at Birr to the BPS
- Operational ancillary infrastructure at frequent intervals along the length of the pipeline including Line Valves, Air Valves, Washouts, Manways, parking Lay-Bys for maintenance access and power connections to the Line Valves.

3.2 Interaction with European Sites

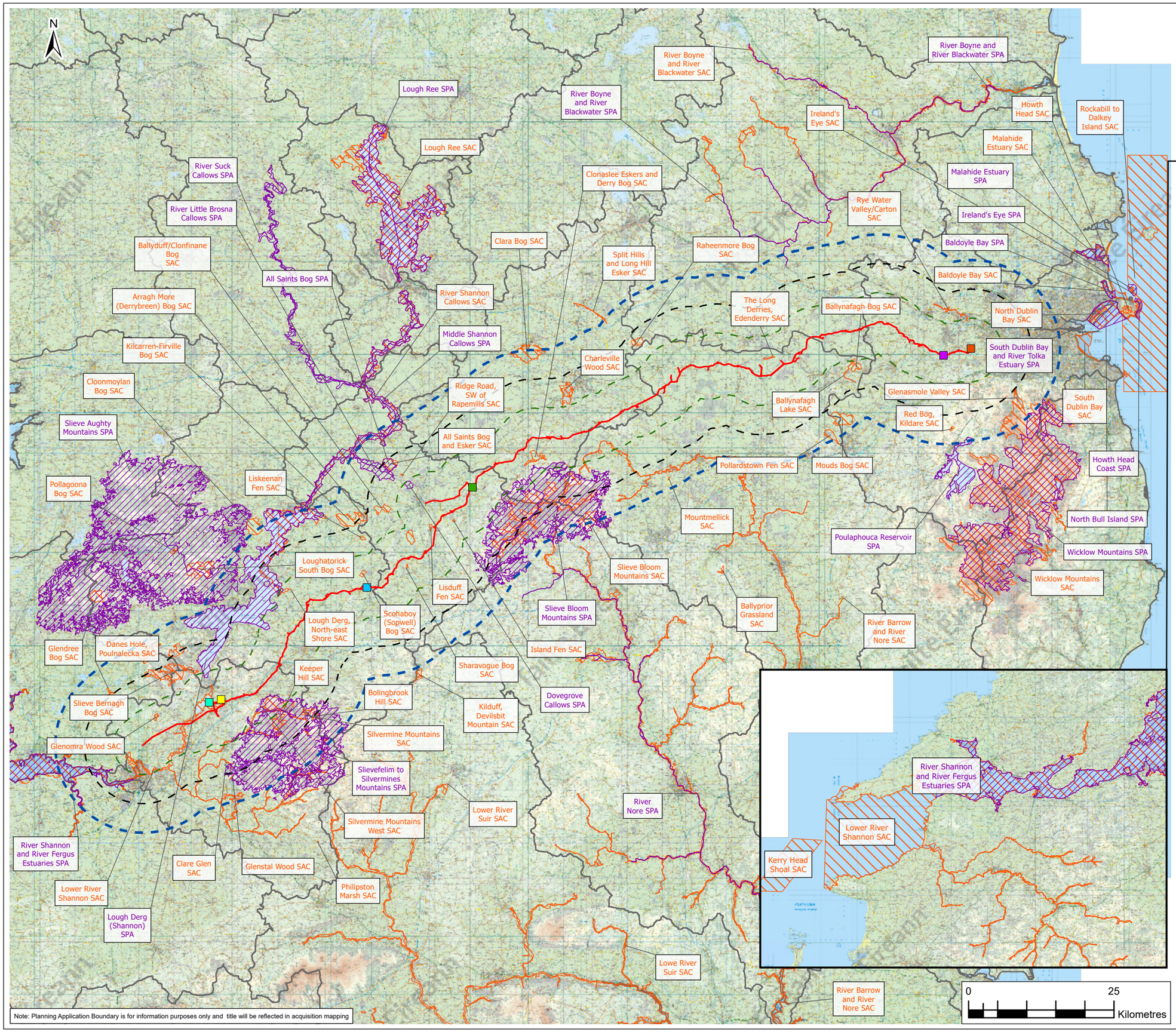
170. Through the evolution of the design of the Proposed Project (including the appraisal of a range of options for delivering the project needs), the routing of the pipeline, and the refinement of the design, it has been possible to avoid most direct impacts on European sites. In summary, these measures include the following and are discussed in more detail in Section 3.5:

- Routing of the Construction Working Width and siting of infrastructure to avoid directly entering European sites
- Trenchless crossing techniques (see Chapter 5: Construction & Commissioning of the EIAR for further details) of the pipeline under select watercourses during the Construction Phase to avoid and minimise impacts on the aquatic environment and downstream European sites
- Selection of Parteen Basin as the location for abstraction of water as a location with lesser impacts on European sites than other locations such as the north-east shore of Lough Derg (Jacobs TOBIN (2015b); i.e. abstraction of water from the north-east shore of Lough Derg would likely have a direct impact on the Lough Derg, North-east Shore SAC. Furthermore, in comparison to an abstraction of water at Parteen Basin, the increase in flushing time associated with abstraction in the north-east of Lough Derg which would be likely to cause a change in nutrient concentrations

downstream as far as Parteen Weir which would affect water quality status. This in turn could impact on shallow water flora and fauna communities, removing the possibility to say, with certainty, that there would be no negative impact on the conservation status of the Lough Derg, North-east Shore SAC, Lough Derg (Shannon) SPA and/or Lower River Shannon SAC)

- Siting of the RWI&PS in an area of Parteen Basin that is within the Lower River Shannon SAC, but is not within or adjacent to any SPAs, Annex I habitats or habitats listed as qualifying interests of the Lower River Shannon SAC. Annex II otter, listed as a qualifying interest of the Lower River Shannon SAC, occur along the shoreline of Parteen Basin, however, no holts were recorded within the footprint of the RWI&PS or within its proximity. No other qualifying interest species were found to occur within the selected site for the RWI&PS.

171. The Proposed Project overlaps with a single European site; the Lower River Shannon SAC, where the RWI&PS is located on the eastern shore of Parteen Basin, where the 38 kV Uprate Works cross the Lower River Shannon, and where the two underground cable ducts laid in the R494 from Birdhill to the entrance of the RWI&PS access road (to facilitate power supply to the RWI&PS) cross the Kilmastulla River (WCX077), as shown on Figure 3.2 and Figure 3.3. For the power to the WTP, a trenchless crossing of the Kilmastulla River using horizontal directional drilling is proposed at WCX001 (Section 3.4.1.3). It should be noted, while the boundary of the Proposed Project overlaps with the boundary of the Lower River Shannon SAC at this location, no works would take place within the SAC. The Proposed Project in the context of European sites is shown on Figure 3.1. Substantial efforts were made to avoid impacts on European sites and thus the pipeline route avoids directly impacting any European site. Due to the length and scale of the Proposed Project, the pipeline route would however be in close proximity to and would indirectly interact with a number of European sites. The ZoI and identifying European sites within the ZoI is discussed in more detail in Section 6 and shown on Figure 6.1.



Note: Planning Application Boundary is for information purposes only and title will be reflected in acquisition mapping

Legend

- Planning Application Boundary
- 15km Buffer from Planning Application Boundary
- 10km Buffer from Planning Application Boundary
- 5km Buffer from Planning Application Boundary
- WFD Catchments

Infrastructure Sites

- Raw Water Intake and Pumping Station
- Water Treatment Plant
- Break Pressure Tank
- Booster Pumping Station
- Flow Control Valve
- Termination Point Reservoir

European Sites

- Special Protection Area (SPA)
- Special Area of Conservation (SAC)

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
F03	21/11/25	Final - Planning Application	SP	LK	SN	SW

Jacobs TOBIN

Client: Uisce Éireann Irish Water; Tionscadal Soláthair Uisce Water Supply Project

Project: Water Supply Project
Eastern and Midlands Region

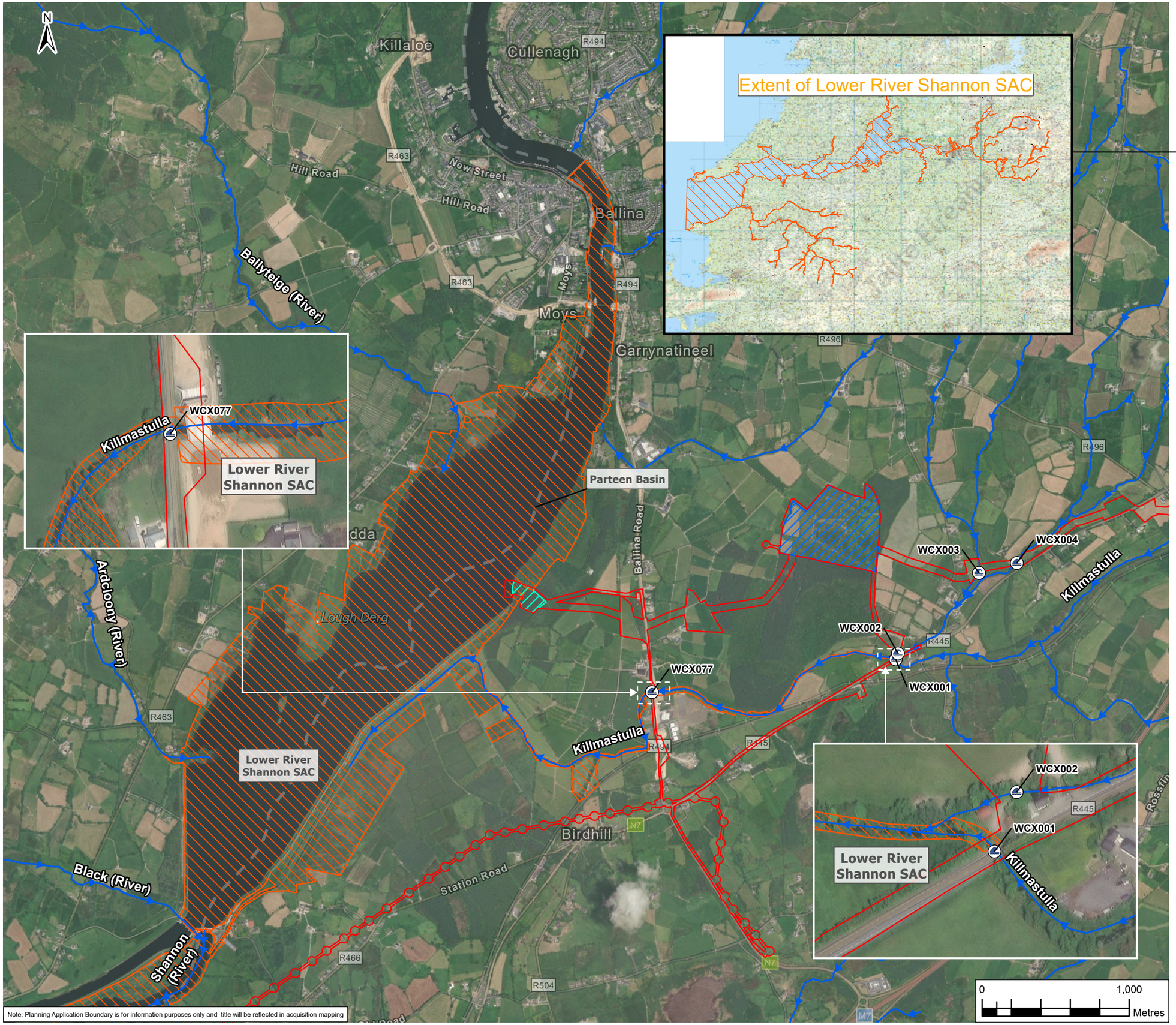
Drawing Title: Figure 3.1
Proposed Project in the Context of European Sites

Drawing Status: Final - Planning Application

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Client No.	9318	
Drawing No.	32105801/700/1596	
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Legend

- Planning Application Boundary
- Watercourse Crossing (WCX – EPA mapped)
- Raw Water Intake and Pumping Station
- Water Treatment Plant
- Special Area of Conservation (SAC)

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
F03	21/11/25	Final - Planning Application	SP	LK	SN	SW

Jacobs TOBIN

Client: Uisce Éireann Irish Water; Tionscadal Soláthair Uisce Water Supply Project

Project: Water Supply Project
Eastern and Midlands Region

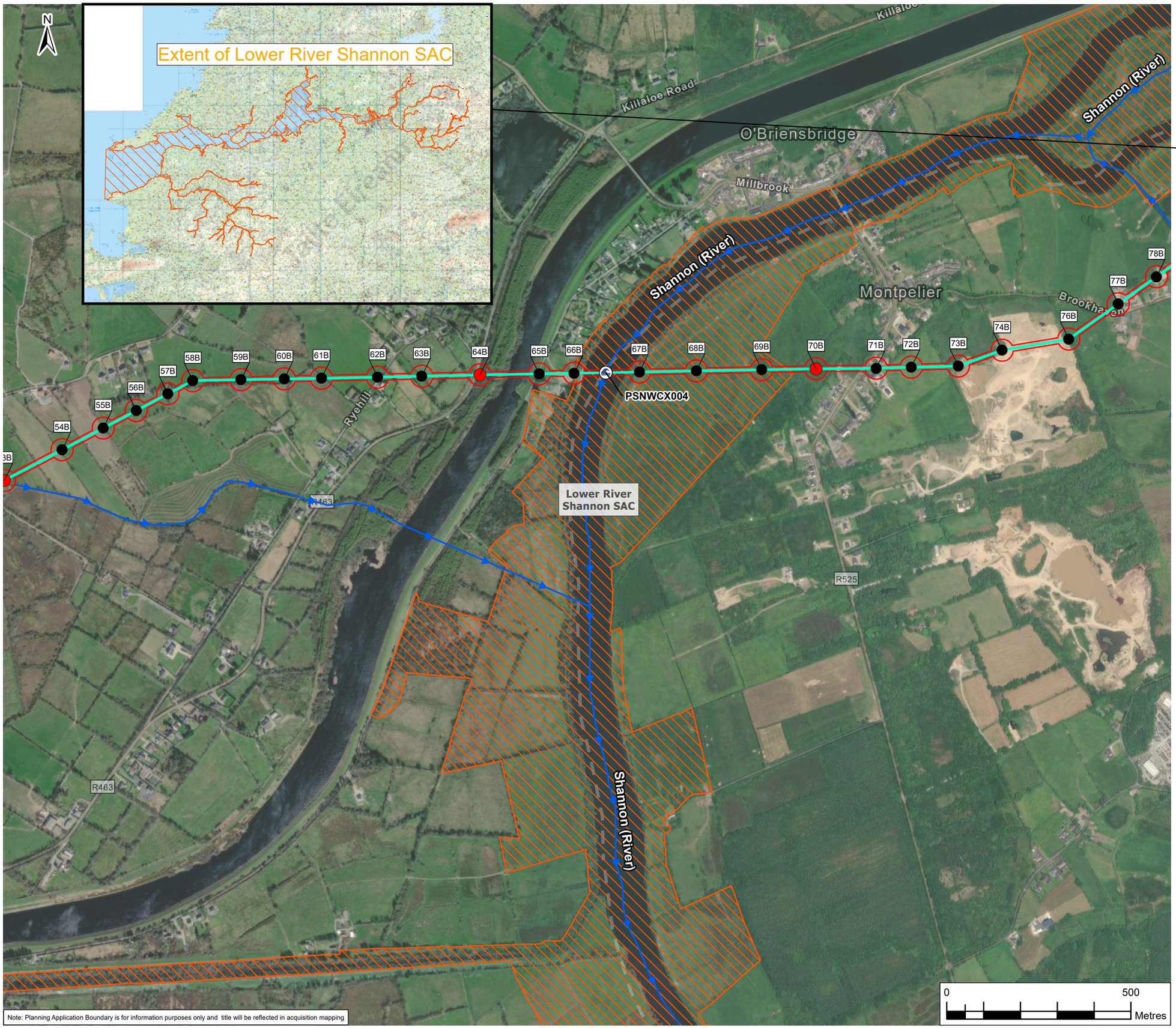
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Proposed Project
in the Context of its Overlap
with the Lower River Shannon SAC (002165)

Drawing Status: Final - Planning Application

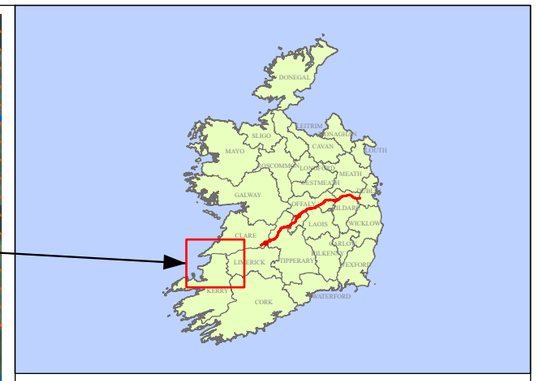
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Note: Planning Application Boundary is for information purposes only and title will be reflected in acquisition mapping



Legend

- Planning Application Boundary
- Watercourse Crossing (WCX – EPA mapped)
- Existing Poleset
- Proposed Polesets/Towers to be Replaced
- Ardnacrusha - Birdhill
- Special Area of Conservation (SAC)

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
F03	21/11/25	Final - Planning Application	SP	LK	SN	SW

Jacobs TOBIN

Client: Uisce Éireann Irish Water; Tionscadal Soláthair Uisce Water Supply Project

Project: Water Supply Project
Eastern and Midlands Region

Drawing Title: Figure 3.3
Proposed Project
in the Context of its Overlap
with the Lower River Shannon SAC (002165)

Drawing Status: Final - Planning Application

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3.3 Proposed Structures

3.3.1 Raw Water Intake and Pumping Station

172. The RWI&PS would be located on the eastern shore of Parteen Basin, in the townland of Garrynatineel, immediately north of and adjacent to the linear reservoir embankment (Fort Henry embankment) as shown on Figure 3.2.

173. The proposed site would be located approximately 3.3km north-east of the Parteen Weir and the entrance to the Ardnacrusha Headrace, 14.3km upstream of ESB's Ardnacrusha Generating Station and 2.9km downstream of the existing bridge at Ballina/Killaloe. The site is approximately 300m south of the Fort Henry Demesne and is currently used for forestry.

174. The proposed site would occupy an area of approximately 3.3ha excluding the permanent access road during construction. However, only an area of approximately 2.6ha would be permanently required (excluding the permanent access road). The site is currently accessed by a private road routed to the rear of the Fort Henry embankment. It is proposed to construct a new access road from the R494 to the RWI&PS site, which would be 5m in width, 670m in length and would require a permanent area of 1.5ha in addition to 0.3ha temporarily during construction.

175. Light-emitting diode (LED) external lighting would be provided at the perimeter of the Raw Water Pumping Station Building and the two Microfiltration Buildings, on interconnecting footpaths, on traffic circulation areas around the site, in the car parking area and at the entrance to the site. In addition, exterior lighting would be provided to illuminate particular work areas to facilitate operational maintenance. External lighting would be designed to avoid night sky pollution/upward spill, and overspill into adjacent properties and Parteen Basin. Exterior lighting would be automatically controlled and would be turned off unless operational staff are present on-site. The design of external lighting at the RWI&PS site would be carried out with reference to the following Standards:

- Lighting Guide LG06: The Exterior Environment (Chartered Institution of Building Services Engineers 2016)
- 2017 Guide on the Limitation of Effects of Obtrusive Lighting from Outdoor Lighting Installations 2nd Edition (Commission Internationale de l'Eclairage 2017)
- Bats and Artificial Lighting at Night. Guidance Note 08/23 (Bat Conservation Trust 2023).

176. Rainfall runoff from roads and impermeable areas would be conveyed via a drainage system to a Stormwater Attenuation Tank. An oil/petrol interceptor would be located immediately upstream of the attenuation tank. The volume of the attenuation tank required to accommodate flows from a 1 in 100-year event is 125m^3. A flow control device on the outlet of the tank would limit discharge stormwater flow leaving the tank to a maximum of 17.35l/s, equivalent to the greenfield runoff from the entire RWI&PS site. Flow from the attenuation tank would be conveyed by a 200mm diameter drain along the RWI&PS access road to a local drainage ditch (WBX002) approximately 350m along the access track from the R494.

177. The site would not be permanently staffed and so foul wastewater generated by operational staff on the site would be less than 1m^3/d and would be tankered from the Wastewater Holding Tank to a licensed Wastewater Treatment Plant.

3.3.2 Raw Water Rising Mains (RWRMs)

178. Abstracted raw water would be pumped from the RWI&PS through approximately 2km length of twin 1,500mm nominal diameter steel pipes (run in parallel with one another with a minimum 5m separation distance) (Figure 4.7 in the EIAR). The RWRMs would extend in a generally east-south-easterly direction from the RWI&PS for approximately 850m through local forestry and open agricultural grassland, crossing a disused railway, within the townland of Coolnadornory as far as the R494. From the R494 the RWRMs would continue in an east-north-easterly direction, through further agricultural grassland and forestry in the townlands of Kilmaglasderry and Knockadromin before entering the WTP at Incha Beg.

3.3.3 Water Treatment Plant

179. The WTP would be located in the townland of Incha Beg in County Tipperary, and approximately 2.6km north-east of the village of Birdhill, approximately 2km east of the proposed RWI&PS. The proposed site would be located within a sparsely populated rural area which is broadly bounded within a triangle formed by the R496, R445 and R494 regional roads. The WTP site would be located immediately north of dense woodland, but is itself made up of open fields, covering an area of approximately 30ha (29.1ha permanently required and 0.9ha required during Construction Phase only) excluding the proposed permanent access road (Figure 4.7 of the EIAR). The site is currently accessed by a privately-owned, unsurfaced track from the R496. It is proposed to construct a new permanent access road from the R445. The proposed access road would be 6m in width and 640m in length and would cover an area of approximately 1.8ha. In addition, a further approximately 1.6ha would be required temporarily during construction to build the access road. There would also be potential future connection point at the access road.

180. It is proposed to remove four buildings in total from the WTP site and access road. A single farm shed located toward the centre of the WTP site would be removed to accommodate construction of the WTP itself. Three buildings and above-ground petrol pumps associated with an existing but disused petrol station on the R445 Regional Road would be removed in order to form the junction of the access road to the WTP site and the R445 Regional Road. The buildings in question are a derelict stone building, a roofed storage shed/garage, and a roofed office building. The proposed access would cross the Knockadromin Stream (WCX002; which is upstream of the Lower River Shannon SAC) 50m to the west of the former petrol station. Two disused pumps and an underground storage tank are surrounded by the Kilmastulla River and Knockadromin Stream (Kilmastulla_050) and the R445. The tanks are located within 1m of the Knockadromin Stream. Site investigations were conducted in May 2021 along the Knockadromin Stream bank and the Kilmastulla River. No oil or oil staining was noted on the Knockadromin Stream. Samples were taken upgradient and downgradient of the former petrol station. Soils and surface water concentrations along the Knockadromin Stream are comparable to natural background metal and hydrocarbon concentrations (Baker *et al.* 2007). Results are included in EIAR Appendix A10.15 (Summary of Private Groundwater Supplies). It is important to note that only above-ground structures need to be cleared from the petrol station site, to allow construction of the access road junction and provide the required safe sight distances.

181. In order to protect the watercourse immediately adjacent to the buildings, the watercourse would be dammed, and flow diverted, either by over pumping or fluming, for the duration of the demolition works. This involves constructing a dam (sandbags and suitable clay material) across the existing watercourse upstream of the proposed demolition works. A suitably sized pump sump(s) would then be used to extract the water and convey it around the demolition works area to a point downstream of the works. Alternatively, the flows can be conveyed by a suitably sized pipe (fluming) to downstream of the works.

182. There would be two drainage systems in place at the WTP. Firstly, harvested runoff, from roofs of buildings and tanks, would drain to the Commissioning Lagoons. Secondly, general site runoff from

internal roads would be taken to an attenuation pond in the south-eastern corner of the WTP site. Building roofs and tank covers would account for approximately 55% of the impervious area of the WTP site. Rainfall runoff from these particular surfaces is considered to be of sufficiently consistent quality to be harvested as a source of raw water. Therefore, roof and tank cover runoff would be collected in a dedicated, separate pipe network which would outfall into the Tank Draindown Management and Commissioning Lagoons and would ultimately be pumped to the RWBTs. The lagoons and the associated return pumping system have been appropriately sized for the probability of extreme rainfall events (1 in 100-year return event with 30% allowance for climate change) occurring concurrently with commissioning or operational requirements. It is expected that approximately 145,160m^3 per year of runoff from roofs and tank covers would be harvested and treated to produce treated water. Harvesting rainwater in this manner would reduce stormwater runoff from the WTP site that would otherwise have to be managed, and would marginally reduce the volume of pumping required from the RWI&PS. The general site surface water runoff from internal roads would be taken to an attenuation pond in the south-eastern corner of the WTP site. Runoff entering the attenuation pond would pass through an oil/petrol interceptor. A flow control device on the outlet of the pond would limit discharge stormwater flow leaving the pond to a maximum of 239l/s, equivalent to the greenfield runoff from the WTP site as a whole. The flow would then be conveyed by a 600mm diameter stormwater drain (WBX004) running along the route of the WTP access road to discharge into the drainage ditch (WBP221) crossed by the proposed access road approximately 220m north of its junction with the R445, and ultimately into the Kilmastulla_050 (which is part of the Lower River Shannon SAC at its confluence with the drain).

183. Foul wastewater generated on the WTP site, which is estimated at approximately 1m^3/d in normal operation and 2.4m^3/d with visitors to the site, would be tankered from a wastewater tank installed at the WTP to a licensed Wastewater Treatment Plant.

3.3.4 Treated Water Pipeline from the WTP to the BPT

184. The Treated Water Pipeline from the WTP to the BPT would be located within County Tipperary. The proposed Treated Water Pipeline from the WTP to the BPT would be an approximately 37km long, single pressurised 1,600mm nominal diameter buried pipeline designed to transfer treated water from the WTP at Incha Beg to the BPT, located at a high point with an elevation of 142.70 metres Above Ordnance Datum (mAOD), near Cloughjordan, County Tipperary.

185. Generally, the Treated Water Pipeline from the WTP to the BPT would extend in a north-easterly direction through County Tipperary, north of, and parallel to the Kilmastulla River and the Dublin to Limerick Railway, until the first of two crossings of the M7 Motorway in the townland of Kilnacranna (Figure 4.9 of the EIAR). From the M7 the Treated Water Pipeline from the WTP to the BPT would then continue in a north-easterly direction, south of the M7 Motorway, and north of the Slievefelim to Silvermines Mountains SPA (Site Code: 004165) and Silvermines Mountains West SAC (Site Code: 002258) (approximately 1.5km and 1.8km distant respectively), prior to continuing north of the tailings pond at Gortmore towards Carrigatogher Bog (Figure 4.10 and Figure 4.11 of the EIAR).

186. The route of the Treated Water Pipeline from the WTP to the BPT would then continue north of Carrigatogher Bog, crossing the M7 motorway for a second time approximately 13.1km from the WTP (Figure 4.11 of the EIAR) before extending north past the town of Nenagh and crossing the Nenagh River (WCX016) (Figure 4.13 of the EIAR).

187. The route would then continue north, passing at a distance of approximately 700m west of Lough Ourna Proposed Natural Heritage Area (pNHA) (Site Code: 000650), before crossing the N52 north-east of Ardcrony village (Figure 4.16) from where it extends in a more easterly direction.

188. From the crossing of the N52, the Treated Water Pipeline from the WTP to the BPT would continue for a further 8km before discharging into the BPT at Knockanacree Hill, adjacent to Knockanacree Wood and due north of Cloughjordan, as shown in Figure 4.18 of the EIAR.

3.3.5 Break Pressure Tank

189. The site for the proposed BPT (Figure 4.18 of the EIAR) would be located in the townland of Knockanacree in County Tipperary, approximately 1.8km north of the town centre of Cloughjordan and south of the Scohaboy (Sopwell) Bog SAC (Site Code: 002206) and Scohaboy Bog Natural Heritage Area (NHA; Site Code: 000937) (1.8km and 700m respectively). The proposed site area would be approximately 5.5ha (excluding the access road) and would be located approximately 37km from the WTP at Incha Beg in County Tipperary. This would comprise 5.2ha of permanent land take and a further 0.3ha of land only required temporarily during construction. At present the site is predominantly in agricultural use, as pastureland, and is accessed from the L1064 road via an unpaved farm track. It is proposed to construct a new access road from the L1064, which would be 5m in width and approximately 794m in length and would cover an area of 1.8ha. There are three looped walks (Oak Walk, Ash Loop, and Beech Trail) within the Knockanacree Woods, adjacent to the site, and an access track to facilitate maintenance and inspection of the existing telecoms mast to the north-east of the proposed BPT site. The proposed site layout has taken consideration of the access requirements for the existing telecoms mast and allows for the continued use of a dedicated access track to the mast around the BPT site boundary.

190. The proposed BPT would be a rectangular roofed concrete structure, visually softened by earthen embankments.

191. The BPT access road, and other paved areas, have been designed to incorporate SuDS principles as recommended by the SuDS Manual (C753) (Construction Industry Research and Information Association (CIRIA) 2015), in order to limit discharges of rainwater runoff from the BPT site to the equivalent greenfield site flow rate. The roof of the BPT would be a 'green roof' to limit surface water runoff. Filter drains within the site boundary fence would collect surface water and direct it to the infiltration basin via small pumps in an underground chamber. An oil/petrol interceptor located upstream of the infiltration basin would provide protection against spillages. The infiltration basin has been designed to hold a volume of 273m^3 to accommodate flows from a 1 in 100-year storm, with a 30% uplift for climate change. Filter drains with soakaways would provide drainage along the access road between the BPT and the L1064. These would collect surface water and direct it to one of four infiltration sumps located along the access road. These sumps have been sized to accommodate flows from a 1 in 100-year rainfall event with a 30% climate change uptake.

192. Foul wastewater generated on the site would be directed to a holding tank with a level sensor to alert when emptying is required. It would then be tankered away for disposal at a licensed Wastewater Treatment Plant. The site would not be permanently staffed and so foul wastewater generated by operational staff on the site would be less than 1m^3/d.

3.3.6 Treated Water Pipeline from the BPT to the TPR

193. The proposed Treated Water Pipeline from the BPT to the TPR would be approximately 133km long, single 1,600mm nominal diameter buried pipeline, designed to transfer treated water from the proposed BPT at Knockanacree in County Tipperary to the proposed TPR adjacent to, and immediately west of, Peamount Hospital in County Dublin.

194. From the BPT, the proposed Treated Water Pipeline from the BPT to the TPR would extend in an east to north-east direction through eastern County Tipperary and Counties Offaly and Kildare before terminating in County Dublin (Figure 4.18 to Figure 4.60 of the EIAR). The Treated Water Pipeline from the BPT to the TPR would be primarily routed through agricultural grassland but there are extensive areas of peatland in County Offaly and County Kildare through which the pipeline would be constructed.

3.3.7 Booster Pumping Station

195. The proposed BPS site would be located to the east of Birr, in the townland of Coagh Upper, County Offaly, approximately 30km downstream from the BPT. The BPS site would be located within a rural area of agricultural land adjacent to the L3003 (Figure 4.27 of the EIAR). The proposed BPS site would occupy an area of approximately 5.1ha, excluding the permanent access road. Part of the site is only required temporarily during construction and therefore the temporary land-take would be approximately 2.9ha. The BPS would be accessed directly off the L3003 by a short access road 5m wide to facilitate articulated vehicles. The permanent access would require 0.4ha of land. In addition, a further 0.9ha would be required temporarily during construction to build the access road.

196. Surface water runoff from impermeable areas would be conveyed via an oil/petrol interceptor and underground drainage system to a stormwater attenuation pond located to the front of the BPS site. This allows for any build-up of pollutants on the internal roadway or hard standing working areas that would be washed off in the early part of a storm to be treated. Water from the attenuation pond would be discharged, at greenfield run-off rates, via a 200mm diameter underground pipe to the small stream, an un-named tributary of the Camcor River, located approximately 200m east of the BPS site.

197. Foul wastewater generated by operational staff on the BPS site would be tankered from the wastewater holding tank to a licensed WwTP. The site would not be permanently staffed and so foul wastewater generated by operational staff on the site would be less than $1m^3/d$.

3.3.8 Flow Control Valve

198. The FCV would be located approximately 5km west of the TPR in the townland of Newtown in County Kildare (Figure 4.58 of the EIAR). The proposed FCV site would occupy an area of approximately 0.9ha (excluding the access road) with 0.5ha of permanent land take and an additional temporary area of 0.4ha required during construction. Access to the FCV site would be directly off the L1016 Commons Road Upper. The permanent access would not require permanent additional land beyond that allowed for the site, however; in order to build the access point from the L1016 there would be a further, 0.3ha of land required temporarily during construction.

199. The FCV access road, and other paved areas have been designed to incorporate SuDS principles as recommended by the SuDS Manual (CIRIA 2015) in order to limit discharges of rainwater runoff from the FCV site to the equivalent greenfield site flow rate. This would include provision of filter drains to act as attenuation devices and would disperse surface and stormwater in a controlled manner to the attenuation pond located to the north-west of the site. This would have a capacity of $52m^3$.

3.3.9 Termination Point Reservoir

200. As shown in Figure 4.60 of the EIAR, the proposed TPR would be located adjacent to the existing service water reservoir site at Peamount in County Dublin. The proposed site area is currently in agricultural use. Excluding the access road, the permanent land area requirement would be 7.5ha. There would be an additional temporary land area requirement of 1.1ha during construction, including for a power cable diversion on the perimeter of the site. The TPR has been designed to have a capacity of 75Ml. It would be similar in shape and form to the existing 40Ml reservoir structures on the adjacent site, consisting of a rectangular tank of three-cells constructed from reinforced concrete and surrounded by earth embankment. The target water level in the TPR would be the same as in the existing reservoir. The top of the TPR would be 11.2m above finished ground level.

201. The current access to the existing service reservoir is off the R120 via a public road on the north-eastern perimeter of Peamount Hospital. This access is relatively narrow and only receives incidental volumes of traffic to the various properties along its route; there is no through traffic as it is a cul de sac.

202. The TPR would occupy the northern portion of the site where ground levels are in the range of approximately 79-80mAOD. The site is currently accessed via the access to the existing service reservoir, and an unpaved farm track suitable for off-road vehicles only. This unpaved farm track follows the north-eastern and north-western perimeter of the existing service reservoir boundary.

203. It is proposed to construct a new access road from the R120, adjacent to the western and northern perimeter of Peamount Hospital, which would be 5m in width and approximately 342m in length and would cover an area of 0.9ha. There would be no additional land temporarily required to build the access. The new road is required due to the number of domestic properties along the existing access road which render it unsuitable for construction traffic.

204. The TPR access road and other paved areas would be designed to incorporate SuDS principles as recommended in the SuDS Manual (C753) (CIRIA 2015) in order to limit discharges from the TPR site to the equivalent greenfield site flow rate. As part of this approach the TPR would have a 'green roof' on top which would have a biodiversity benefit as well as reducing the speed of surface water runoff. Filter drains would disperse surface water to attenuation basins. There would be two attenuation ponds at the TPR site. One of these would be on the northern side of the site and have a capacity of 1,229m^3. The second infiltration pond would be located to the southern end of the site beside the entrance and have a capacity of 1,329m^3. Both of these ponds have been sized to accommodate flows from a 1 in 100-year storm event with a 30% climate change uplift. Surface water from the attenuation basins would be discharged, at greenfield runoff rates, via a 200mm diameter underground pipe to the network of field drains and ditches located to the north and west of the site.

205. There is no requirement for foul drainage as part of the proposed TPR. The existing facilities would be used by site operatives.

3.4 Other Elements of the Proposed Project

3.4.1 Power Supply

3.4.1.1 38 kV Uprate Works

206. A primary component of the Proposed Project would be the provision of power supply infrastructure to meet the power needs of a number of components of the Proposed Project. This would include in particular the RWI&PS, WTP, and ancillary pipe infrastructure such as Line Valves. In order to deliver the requisite quantity and quality of power for the Proposed Project, ESB Networks (ESBN) have identified a number of uprating tasks that are required to be carried out to existing infrastructure. These works provide for the uprate of the Ardnacrusha – Birdhill 38 kV line.

207. The principal elements which would be associated with the uprate works, including construction techniques and equipment to be used, are provided in detail in Chapter 4 of the EIAR (Proposed Project Description) and Chapter 5 (Construction and Commissioning). However, outlined below is a summary of the works which would be carried out. These are as follows:

- Extension of existing 38 kV Substation at Birdhill:
  - Site clearance and removal of existing poles (to be replaced with new poles)
  - One new 38 kV Gas Insulated Switchgear modular building, maximum 4.8m high and floor area of 28m^2
  - Provision of electrical plant and equipment, new poles and three 4m lighting poles
  - All site works, including internal access road and new 2.6m high palisade fence
  - Provision of all site services including lighting and drainage.
- Ardnacrusha – Birdhill 38 kV Line Uprate:

- The proposed 38 kV Uprate Works on the Ardnacrusha – Birdhill 38 kV Line would commence at existing poleset 6B and terminate at Birdhill Substation
- Replace fittings, which would involve the removal of existing fittings, followed by the installation of new fittings. These would include smaller-scale items such as brackets, insulators and clamps
- Replace crossarm and fittings, which would involve the removal of crossarm and fittings, followed by installation of new crossarm and fittings
- Replace intermediate poleset (IMP) structures – this would involve removing all associated fittings, stays, cutting and removal of the poles, followed by the installation of new poles, stays, crossarm and fittings
- Replace angle structures – this would involve the removal of the structure and all associated fittings, followed by construction of new structure and installation of fittings
- Replacing the conductor, which would involve re-stringing by pulling the conductor between the angle masts across the entire line
- Mid-span conductor joint installation at the stringing location.

208. Currently, there are 110 structures on the Ardnacrusha – Birdhill Line. For this line, 14 new or replacement polesets would be required together with one new replacement tower. These poles would be located immediately adjacent to existing polesets and would be required to support the weight of the new conductor. Figure 4.73 to Figure 4.80 of the EIAR provide an overview of all replacement structures and locations of all polesets where works such as crossarm and fitting replacements would take place.

- Ardnacrusha – Birdhill – Nenagh 38 kV Line Cabling Works:
  - A section of the line currently located on the eastern side of the R494 would be undergrounded
  - This would involve the retirement and removal of 10 existing polesets and one tower and the provision of a twin 38 kV underground cable running from Birdhill Substation to the existing poleset 242.

209. The proposed 38 kV Uprate Works would partially be located within the boundaries of one European site; namely, the Lower River Shannon SAC. Three of the existing polesets along the line are located within this SAC; polesets 67B to 69B. Approximately 567m of the line is contained within the SAC. In relation to the proximity of existing polesets to the River Shannon, poleset 66B is located outside and approximately 10m west of the SAC and 25m from the banks of the river, while poleset 67B is located inside the boundaries of the SAC approximately 32m east of the banks of the river. In addition, the two underground cable ducts laid in the R494 from Birdhill to the entrance of the RWI&PS access road (to facilitate power supply to the RWI&PS) cross the Kilmastulla River, which is part of the Lower River Shannon SAC at this location (Figure 3.2 and Figure 6.1).

210. In order to facilitate access to individual OHL sites, the construction crews would be required to utilise the local public road network surrounding the lines. From here, access to each individual site in question, typically located on private land, would use an access route identified by the project team. In order to consider the potential environmental impacts, access routes have been identified in accordance with the following:

- Identification of suitable public roads and private roads surrounding the line
- Use desktop sources to draft suitable access points and access routes typically located on private lands
- Contact landowners to confirm access for site surveys and verification
- Site visits to confirm construction access routes to structure locations including the type of access and mapping of the routes

- Consideration of potential environmental impacts on proposed routes and revision of proposed routes as necessary
- Finalisation of access route mapping.

211. ESBN would use existing farm entrances and tracks and/or tracking across farmland where land conditions are suitable. Access to structure locations would be carefully selected to avoid likely significant effects on the surrounding area.

212. Access in any peat area or wetland (approximately 37.8ha, 1.55ha of which would be located within the Lower River Shannon SAC) would be achieved using wide tracked, low ground-pressure vehicles to minimise damage to the surrounding ground. In particularly sensitive or wet areas, aluminium bog mats would be installed to mitigate any possible damage to the terrain used to access, and within the footprint of the proposed works.

213. The method of access, whether simply traversing across existing fields or laying surface protection materials such as aluminium bog mats, is dependent on the nature of the works to be undertaken at each site, the local ground conditions and the ecologically sensitive nature of the area. In so far as is possible, existing tracks have been used in the access route selection.

214. Access mapping has been carried out to provide construction crews with detailed maps of the agreed access routes, taking into account the sensitivity studies carried out. These are included as EIAR Figure 8.4 to EIAR Figure 8.10.

215. During the Construction Phase, if a proposed access route should become unavailable, an alternative access route would be identified by the Project Team and its development would be undertaken in accordance with the method statement and agreed with the relevant Local Authority. Any alteration to temporary access routes for the 38 kV Uprate Works will be agreed with the Ecological Clerk of Works (ECoW) in advance to ensure avoidance of impacts to ecologically sensitive receptors.

3.4.1.2 RWI&PS Power Supply

216. Power supply to the RWI&PS would be provided from the existing Birdhill 38 kV Substation. Two 125mm diameter unplasticised polyvinyl chloride (uPVC) ducts have been installed as part of the Killaloe Bypass, Shannon Bridge Crossing and R494 Improvement Scheme, which facilitate the installation of a 20 kV cable along the R494 from the Birdhill 38 kV Substation to the RWI&PS. In the event that access to these ducts cannot be made available for the Proposed Project, provision has been made within the Proposed Project for the construction of alternative ducting from the Birdhill 38 kV Substation along the R494 to the RWI&PS.

217. The ducting would be laid in the same trench, along the eastern side of the R494, for a length of approximately 1.4km from the existing Birdhill 38 kV Substation to the entrance of the proposed RWI&PS access road. The ducting would be laid with a minimum cover of 750mm and a minimum spacing of 75mm between the ducts, in accordance with ESB standards (EIAR Appendix A4.2: Standard Specification for ESB 38 kV Networks).

218. The 20 kV ducting would cross the Kilmastulla River (WCX077; which is within the boundary of the Lower River Shannon SAC at this location; Figure 3.2) using horizontal directional drilling methods. The trenchless crossing of the Kilmastulla River would be approximately 20m in length. The level of the ducting would be 1.0m below the invert level of the river at the crossing point.

219. Approximately 1.4km north of the Birdhill 38 kV Substation, the ducting would be brought off the R494, turning west along the proposed RWI&PS access road. The ducting would be laid along the length of the access road, into the RWI&PS site itself, connecting into the electrical substation on the site.

3.4.1.3 WTP Power Supply

220. Power for the WTP would also be taken from the existing Birdhill 38 kV Substation. Eight 110mm diameter uPVC cable ducts, arranged in accordance with the ESB Standard Specification Detail 1B (EIAR Appendix A4.2: Standard Specification for ESB 38 kV Networks), would be laid in open trench cutting with a minimum depth of cover of 750mm to the uppermost ducts.

221. From the existing Birdhill 38 kV substation, the ducting would be laid for the most part in the south-eastern margin of the R445 Regional Road. Approximately 1.4km east of the Birdhill 38 kV Substation, the ducting would run south of the Limerick to Nenagh railway line before crossing under the railway line (RYX004) using trenchless technology (horizontal directional drilling). The length of this trenchless crossing would be approximately 26m.

222. North of the railway crossing the ducting would be brought back onto the R445 and continue eastward as far as the Kilmastulla River. The ducting would be brought off the road to the south-east of the R445. A trenchless crossing of the Kilmastulla River (WCX001; upstream and adjacent to the boundary of the Lower River Shannon SAC; Figure 3.2) would be undertaken using horizontal directional drilling. This crossing would be approximately 14m in length. While the boundary of the Proposed Project overlaps with the boundary of the Lower River Shannon SAC at this location, no construction works will take place within the SAC at this location.

223. Once across the river, the ducting would be brought along the proposed WTP access road, on to the WTP site (crossing additional tributaries of the Kilmastulla River (WBX004, WCX002 and WBP221)) and into the 38 kV Substation which is to be constructed on the WTP site.

3.4.1.4 BPT Power Supply

224. A new power supply would be required to supply the BPT site. There is an existing medium voltage (MV) OHL to the north of the site (EIAR Figure 4.67) and crossing perpendicular to the BPT access road. It is proposed that a connection be made to this power line, and that ducting would be provided in the BPT access road to route it to the proposed Control Building on the south side of the BPT site. Two 20 kV MV cables would be laid in two 125mm diameter uPVC ducts and laid with a minimum cover of 750mm and a minimum spacing of 75mm between the ducts, in accordance with the ESB standards (EIAR Appendix A4.2: Standard Specification for ESB 38 kV Networks).

3.4.1.5 BPS Power Supply

225. Power for the BPS would be provided by looping a 38 kV cable from the existing 38 kV OHL network in the locality. There are two existing lines traversing the site and as part of the site set up these would need to be diverted. A temporary connection would be made to the diverted lines to provide a supply during construction. Eight 110mm diameter uPVC cable ducts, arranged in accordance with the ESB Standard Specification Detail 1B (EIAR Appendix A4.2: Standard Specification for ESB 38 kV Networks), would be laid in open trench cutting with a minimum depth of cover of 750mm to the uppermost ducts. This temporary supply would be supplemented with on-site use of generators.

226. The route of the incoming power supply to the BPS would be along a 9km route from the 38 kV OHL to the south of the BPS site along regional and local roads including the R440 and L3003 (as shown in EIAR Figure 4.27 to EIAR Figure 4.30 inclusive). Ground mounted solar panels are proposed on the southern side of the BPS site (as shown in EIAR Figure 4.68). These would provide a peak power output of 20kWp which would help to run the telemetry and Supervisory Control and Data Acquisition (SCADA) systems for a portion of each day. This would reduce the energy required from the main supply.

3.4.1.6 FCV Power Supply

227. A new ESB power supply would be required for the FCV. There is an existing low voltage (LV) OHL traversing the south-western perimeter of the site. It is proposed that a connection be made to this power line, via a combination of OHLs and buried cables routed to a control kiosk on the site. This supply may also be used during construction supplemented with by the use of on-site generators.

3.4.1.7 TPR Power Supply

228. There is an existing power line crossing the TPR site. This is to be diverted as part of the permanent works, and this would be undertaken as part of the site establishment. There is an existing substation powering the existing pumping station at the existing 40Ml reservoir adjacent to the site. There is available capacity within the existing network to supply temporary and permanent connections. This would be used during construction, supplemented with generators, as required.

3.4.1.8 Power to Line Valves

229. A permanent electricity connection would be required at each Line Valve location to provide power to the valve actuators, SCADA, sensors, telemetry equipment, and site infrastructure.

230. Power would be supplied to the Line Valve sites via a connection to an existing electricity supply using a mix of OHLs and underground cables as appropriate. New polesets, and OHLs would deliver power from the connection point on the electricity network to the Line Valve sites. These polesets, which include the cable stays, would be installed by the ESBN. The hole for the pole would be dug by an excavator to a depth of at least 2m and a footprint of 0.5m^2. The pole would be installed vertically to the correct height by a pole erection vehicle or an excavator with pole erection equipment, and the pole backfilled in quick set concrete. If a steel cable stay is required, it would be set at an angle of 45 degrees and anchored 1.2m into the ground. A cattle guard would be provided to the cable stay for protection. Once inside the Line Valve site boundary, the OHL would be dropped, entering the control kiosk via underground cabling. All ducting for underground cables would be laid as described in Section 3.4.1.2.

3.4.1.9 Supply to Construction Compounds and Pipe Storage Depots (Temporary Sites)

231. Temporary power connections would be required to the Construction Compounds and Pipe Storage Depots; these have been outlined in Table 3.1.

Table 3.1: Existing Power – Proximity to Construction Compounds and Pipe Storage Depots

Location	Available Power	Remarks
RWI&PS, Satellite Construction Compound (CC0)	Low voltage (LV)/medium voltage (MV) OHLs	Nearest connection to the existing power line 310m west of the site. This would be a temporary connection. There would also be a poleset to be moved along the permanent access road requiring a very minor realignment of the existing line.
WTP, Principal Construction Compound (CC1)	LV/MV OHLs	Existing power line crossing the north-west corner of the site. This would be diverted as part of the permanent works. A temporary connection to this diverted line would be required during the construction of the WTP.
Lisgarriff, Principal Construction Compound (CC2)	LV/MV OHLs	Nearest connection in field other side of the N52 National Road, 75m west of the site. This would be a temporary connection.

Location	Available Power	Remarks
BPT, Satellite Construction Compound (CC3)	MV OHLs	Existing power line north of site and crossing the access road to the BPT. There would be a poleset to be moved along the permanent access road requiring a very minor realignment of the existing line. Connection to existing power line at interface with access road and new cabling routed along the access road to the BPT site. Whilst initially a temporary connection, this would become the permanent connection to the BPT.
BPS, Satellite Construction Compound (CC4)	LV/MV OHLs	Existing power lines (two) traversing the site. These would be diverted as part of the permanent works. A temporary connection to this diverted power line would be required to serve the construction works.
Killananny, Principal Construction Compound (CC5)	LV/MV OHLs	Existing power line traversing north–south across the site. A temporary connection would be made to this line.
Drummond, Principal Construction Compound (CC6)	LV/MV OHLs	Existing power line traversing north–south across the site. A temporary connection would be made to this line.
TPR, Satellite Construction Compound (CC7)	LV/MV OHLs	Existing power line crossing the site. This is to be diverted as part of the permanent works. Existing substation powering the existing pumping station adjacent to the site. Available capacity within the existing network to supply temporary and permanent connections.
Carrigatogher (PSD1)	LV/MV OHLs	Existing power line traversing south-east corner of the site. A temporary connection would be made to this line.
Toora (PSD2)	LV/MV OHLs	Nearest connection to the existing power line 300m north-west of the site. A temporary connection would be made to this line.
Boveen (PSD3)	LV/MV OHLs	Existing power line traversing east–north of the site. A temporary connection would be made to this line.
Fortel (PSD4)	LV/MV OHLs	Nearest connection to the existing power line in road 400m west of the site. A temporary connection would be made to this line.
Derrinboy (PSD5)	LV/MV OHLs	Nearest connection to the existing power line in road 150m north of the site. A temporary connection would be made to this line.
Derryweelan (PSD6)	LV/MV OHLs	Nearest connection to the existing power line in field 400m east of the site. A temporary connection would be made to this line.
Rathlumber (PSD8)	LV/MV underground cables	Nearest connection to the existing power line in field 20m south of the site. A temporary connection would be made to this line.
Graiguepottle (PSD9)	LV/MV OHLs	Nearest connection to the existing power line in road 75m north-west of the site. A temporary connection would be made to this line.
Barberstown Lower (PSD10)	LV/MV OHLs	Nearest connection to the existing power line in field 150m east of the site. A temporary connection would be made to this line.

3.4.2 Ancillary Infrastructure

232. Other elements of the Proposed Project such as ancillary infrastructure include:

- Crossing a number of roads, watercourses, power crossings, and railways. The various techniques proposed to cross each of these are described in Section 3.6.2 and in detail in Chapter 5 of the EIAR (Construction & Commissioning)
- The generally 50m-wide temporary Construction Working Width along the pipeline route from the RWI&PS to the TPR
- A Permanent Wayleave of 20m would be retained along the pipelines post Construction Phase. This 20m wide Permanent Wayleave would not be fenced and would be returned to the landowner
- Air Valve chambers for the operation and isolation, if needed, of the raw water and treated water supply pipelines for repair and maintenance. These would be required at frequent intervals throughout the length of the pipelines, as shown on Figure 4.7 to Figure 4.60 of the EIAR. Where possible, the chambers have been sited in close proximity to existing field boundaries, and in-line valves to isolate sections of pipeline are preferentially sited adjacent to public roads for ease of access

- The construction of permanent access roads would be required from public roads to the proposed locations of the RWI&PS, WTP, BPT and TPR (access to the BPS and FCV would be from existing public roads)
- Temporary works to facilitate construction of the permanent works including Pipe Storage Depots at strategic locations along the route of the pipeline are shown in Figure 5.9 to Figure 5.17 of the EIAR
- Temporary works to facilitate construction of the permanent works including Construction Compounds located at the RWI&PS, WTP, BPT, BPS, and TPR as well as at locations along the route of the pipeline as shown on Figure 5.1 to Figure 5.8 of the EIAR.

3.4.3 Haul Roads

233. Haul Roads are part of the public road network which have been designated for the movement of construction materials, plant and labour to, from and between the six infrastructure sites, the pipeline and temporary works areas such as the Construction Compounds and Pipe Storage Depots. They include national, regional and local roads. These Haul Roads, considered suitable for the construction of the water supply infrastructure, have been determined in consultation with TII and with each of the Local Authorities directly, and indirectly, impacted by the Proposed Project. During discussions with Local Authorities on the identification of Haul Roads, no specific improvement measures were requested in advance of the works. The Local Authorities conduct annual inspections of their road network and undertake routine maintenance to ensure road standards. The Haul Roads are shown on EIAR Figure 5.18 to EIAR Figure 5.26.

234. For the construction of the proposed 38 kV Uprate Works, the public road network (including regional and local roads) would be used for the delivery of materials, plant and equipment from an ESBN depot to the development corridor and individual infrastructure locations. The proposed Haul Roads in the immediate vicinity of the 38kV Uprate Works are indicated in EIAR Figure 5.24. All other proposed Haul Roads for the 38kV Uprate Works are as for the Proposed Project (EIAR Figure 5.21 to Figure 5.26). The proposed Haul Roads for the 38kV Uprate Works have been discussed and agreed with the relevant Local Authorities.

3.5 Design Measures

235. A summary of the key intrinsic or incorporated design measures (embedded mitigation) of relevance to avoiding or reducing impacts to European sites are as follows. It should be noted, in the Stage 1 Screening, the likelihood of significant effects on European sites was assessed based upon the source-pathway-receptor model only, and mitigation measures were not considered.

3.5.1 Pipeline Material

236. The pipeline material would be steel. As a relatively lightweight pipeline material, steel permits selected excavated material to be reused in bedding and surround and limits the quantity of material to be disposed of off-site. The steel would be protected from corrosion (i.e. polyethylene coating, holiday free fusion bonded epoxy lining, and an impressed current cathodic protection), thereby avoiding degradation over time. Therefore, there are no predicted likely significant effects associated with the use of steel as a pipeline material.

3.5.2 Positioning of Infrastructure

237. An area or ‘envelope’ of all possible site and route locations was defined and Parteen Basin was identified as the preferred raw water source, which further focused the infrastructure site selection for the RWI&PS and WTP on available options at and near this source.

238. The positioning of site options for the proposed RWI&PS, WTP, BPT, BPS, FCV and TPR, and linear pipeline, was done with the aim of least environmental impact, through good positional design from the outset, avoiding, where feasible, known areas of environmental and technical constraints (Jacobs TOBIN 2015a; 2015b; 2016). This approach sought to avoid areas which were environmentally designated and even undesignated areas of environmental importance. Environmental datasets were used to define land areas of different degrees of constraint. These environmental datasets are outlined in Table 3.2.

Table 3.2: Environmental Datasets used to Define Land Area Constraints

Environmental Dataset	Source
Special Area of Conservation (SAC) (European Sites)	NPWS
Special Protection Area (SPA) (European Sites)	NPWS
Natural Heritage Area (NHA)	NPWS
Proposed Natural Heritage Area (pNHA)	NPWS
Ramsar	NPWS
UNESCO Sites	Marine Irish Digital Atlas (MIDA)

239. The sequence of work was to position infrastructure site and route options in the 'white space' or less constrained areas. These were then evaluated by specialists to identify the 'least constrained' siting positions. This was followed by fieldwork surveys to verify conditions on the ground, along with review of consultation feedback, to determine the 'preferred site' and 'preferred route' in each case.

240. With identification of the preferred option of abstraction at Parteen Basin and treatment of the raw water at Birdhill, and transfer of treated water across the Midlands, subsequent design mitigation focused on elements of that option.

3.5.3 Bankside Intake Designed to Avoid any Pipework on Bed of Parteen Basin

241. The abstraction of raw water from Parteen Basin and delivery of it forward for treatment would take place at the RWI&PS. The proposed site for the new RWI&PS would be located on the eastern shore of Parteen Basin, in the townland of Garrynatineel, immediately north of and adjacent to the linear reservoir embankment (Fort Henry embankment) as shown on Figure 3.2. Two primary approaches to the intake design were considered, namely:

- A Raw Water Intake bankside design. In this option, the intake of water occurs at the bank of the watercourse, via Intake Chambers positioned below ground level and below the lower level of the water in Parteen Basin, as controlled by ESB, from which the raw water flows to the wet well of the Pumping Station and is pumped to the WTP
- An alternative approach considered involved an intake structure extending into the Parteen Basin. This primarily comprises a series of passive screens and intake pipes connecting to land-side structures that pump the raw water to the WTP.

242. Screening technology is the same in each case, comprising a fine mesh screen to prevent the intake of additional material or species, cleansed by a backwashing 'airburst' approach. Screening is designed to avoid water velocities in excess of 0.15m/s in the immediate vicinity of the screening surface, and water would flow by gravity into the Intake Chambers, rather than through any applied mechanical suction. When material intercepted by the screens gives rise to a detected loss of pressure across the screens, the material is dislodged from the face of the screens by a temporary 'airburst', or backflow of air. This backflow of air, through screens which are raised above the base of the bankside Intake Chamber, or the bed of the Basin in the alternative approach, creates a zone of temporary bubble turbulence, comparable to that at any sluice or weir, and the periodic dislodging of natural material which has been

excluded from entering the Intake, would remobilise in the water body and flow downstream past the Intake.

243. The option of extending raw water intake pipework into Parteen Basin was not selected for environmental and safety reasons. The reasons applicable to the SAC are:

- The bankside configuration has a lesser environmental impact on Parteen Basin, located within the SAC, in terms of its construction and operation. At Construction Phase, a greater extent of works on the bed of Parteen Basin would have been required to accommodate in-basin pipework and structures. At the Operational Phase, the pipework and Passive Intake Screens would have been located within Parteen Basin and therefore repair and maintenance work would have had greater potential to affect the qualifying interests of the SAC
- The bankside configuration enables easier and safer control and containment of cleaning operations for the Raw Water Intake and RWRMs, which may arise in the management of INNS in raw water assets, as the structures can be accessed from the land, thus minimising activity within the SAC
- The bankside configuration provides easier and safer access to the fine mesh screen units in the event they need to be withdrawn for repair and maintenance. They can be physically lifted from the water onto hardstand areas at the Pumping Station.

3.5.4 Concrete Revetment Mats Designed to Prevent Bed Erosion at Intake and to Accept Covering of Natural Bed Material for Reinstatement of Disturbed Area

244. The immediate approach area of the bed of Parteen Basin at the intake would be profiled to the Intake Chamber entrance and protected from any erosion by the intake flow. Surplus excavated lakebed material would be removed to the WTP site, where it would be reused.

245. Concrete revetment mats (a proprietary flexible mat of meshed thin concrete segments with voids, manufactured offsite) would be threaded by non-corroding heavy-duty nylon rope, and lifted into place by a crane and lifting bracket (Image 3.1 and Image 3.2). It would be placed on the reprofiled bed and used for erosion control in the area immediately outside the Intake Chamber. During construction works, excavated lakebed material would be screened and washed and would be reused to fill the voids/interstices and cover the revetment panels. Materials would be segregated and screened and stored at the WTP site and brought back at the closing stages of the works. The cover of native bed material over the concrete revetment mats would provide a surface, which can be recolonised by native flora and fauna. Examples of recolonisation of concrete revetment mats can be seen in a study carried out by RAAK-PRO in the Netherlands on the colonisation of different revetment types by seaweed and fauna (RAAK-PRO 2017).



Image 3.1: Stacked Multiple Concrete Revetment Mats (with pontoon crane and suction dredger)



Image 3.2: Revetment Mat Being Lifted into Position (wet installation)

3.5.5 Bankside Intake Designed to Mitigate Against Fish Entrapment

246. Screening for small fish at intakes is common practice, to prevent death and injury. However, screening is not a 'one size fits all' solution and must be optimised based on the age and species of fish that are to be excluded. The key parameters when it comes to Raw Water Intake design is the velocity at which the fish can swim away and how long they can continue swimming at their maximum 'burst' velocity, which must exceed the velocity of the raw water generated by the intake.

247. The proposed Raw Water Intake design includes three intake points within a bankside basin (Raw Water Intake Chamber) excavated to a depth of 7.7m below existing ground level. The openings from Parteen Basin into the Raw Water Intake Chamber would incorporate bubble curtains whereby fine bubble blown across the opening would discourage fish from entering the chamber. Each intake with the chamber would be fitted with a Passive Wedge-Wire Cylinder (PWWC) Intake Screen, to prevent debris and/or fish or eels being taken up into the raw water pumps. The PWWC Intake Screens would be set at an invert level (base interior level) of 27.0mOD at the abstraction point. The PWWC Intake Screens would be approximately 2.0m in diameter and would require a water depth of at least 1.0m above the crown (top) of the screens. On the outside of the intake chamber the existing bed of Parteen Basin itself would be re-profiled to finished levels (along the wall of the intake chamber) of between 26.0mAOD and 25.5mAOD (Malin Head) (28.7mAOD to 28.2mAOD Poolbeg) and tapered over an area of approximately 55m by 27m at the intake site.

248. The publication Screening for Intakes and Outfalls: a best practice guide (UK Environment Agency 2005) states that 'Passive wedge-wire cylinder (PWWC) screens are a tried and tested solution and are generally regarded in Britain as the best available technology for juvenile and larval fish protection.'

249. PWWC screens have a number of features that make them suitable for mitigating against fish entrainment. These include:

- The low through-slot velocity, allowing fish to swim away from the intake flow
- The smooth external finish which is an important factor for prevention of physical impingement
- Narrow slot widths available, making it possible to prevent entrainment of even the smallest fish.

250. The screen slots of the proposed PWWC screens would be sized to limit intake velocities to a maximum of 0.15m/s, the velocity at which juvenile fish that are known to occur in Parteen Basin can swim away without being trapped/held by the screen, taking into consideration average water temperatures (Department of Communications, Marine and Natural Resources 2005). Allowance has been made for a decrease of up to 25% of the screen surface area to account for a degree of fouling of the screens.

251. The guidance document UK Best Practice fish screening trials study (Bromley *et al.* 2014) states that 'the critical swimming speed of fry amounts to 6.5 body lengths per second and a suitable escape criterion (or through slot velocity) for coarse fish, suggested by Solomon, is 15 cm.s-1'.

252. In studies conducted in Norway, Atlantic salmon (*Salmo salar*) smolt length averaged at 14.07cm, while trout smolts of a mean 14.85cm were found (Harvey *et al.* 2020). The smallest elvers had a body length of approximately 6.4-8cm, suggesting the three species would be able to escape at design intake flow levels of 15cm/s.

253. Good Practice Guidelines Annex to the Environment Agency Hydropower Handbook (UK Environment Agency 2009) cites the escape (approach) velocity of the following species, as shown in Table 3.3.

Table 3.3: Environmental Datasets used to Define Land Area Constraints

Species	Escape (Approach) Velocity
Salmonid	0.6m/s
Coarse fish and shad	0.25m/s
Eel	0.5m/s
Lamprey	0.3m/s

254. Studies in USA (Hanson 1979) into the potential for entrainment of fish eggs and larvae on PWWC screens with 1 and 2mm slot-widths and a 0.15m/s through-slot velocity, indicated that a strong flow (>0.3m/s) across the screens, i.e. at 90˚ to the intake flow, greatly reduces the levels of entrainment. An impeller, vertically mounted on the wall of the Intake Chamber and aligned with the PWWC intake screens, would generate this sweeping flow across the screens.

255. In order to discourage fish and eels from entering the Intake Chamber itself, a bubble curtain would be formed across the entrance to the chamber. The bubble curtain would be created by blowing air through slotted pipes running along the top and bottom of the Intake Chamber inlet opening.

3.5.6 Scour Tank Designed to Capture Draindown of RWRMs During Maintenance with no Discharge to the Lower River Shannon SAC

256. Provision has been made to allow each of the twin RWRMs to be emptied to a RWRMs Scour Tank. The RWRMs Scour Tank would be located underneath the microfiltration buildings at the RWI&PS, and it would be possible to return the contents of the Scour Tank back to the Inlet Chambers for re-pumping to the WTP. This system would allow the RWRMs to be emptied for maintenance or in an emergency without having to discharge any water back to Parteen Basin, thereby avoiding any significant adverse effects on the Lower River Shannon SAC. The capacity of the RWRMs Scour Tank, at approximately 3,000m^3, would allow for either RWRM to be emptied in sections. The RWRMs would be laid at gradients that would allow approximately a 1,500m length of mains (from the RWI&PS to the Air Valve at Chainage RW – 1590) to be drained by gravity back to the RWRMs Scour Tank. The section of RWRMs from the Air Valve (at RW – 1590) to the WTP would be drained by gravity to the Tank Draindown Management and Commissioning Lagoons in the WTP site.

257. The following facilities would be provided as part of the design measures in relation to potential infestation by INNS:

- Swab insertion chambers (at the RWI&PS site)
- Manway access points along the RWRMs
- Swab removal chambers (at the WTP site)

- A scour sump to allow contents of the scoured RWRM to be re-circulated to the head of the WTP via the operational RWRM
- Facilities to remove settled solids from the scour chambers and for removal of same to landfill.

3.5.7 Invasive Non-Native Species Filtering Water would be Treated with UV and Recirculated to Inlet Chambers, without Discharge to the Lower River Shannon SAC

258. The following measures are included in the design and are with regard to good practice guidelines recommended in a technical paper on controlling mussels affecting drinking water infrastructure (Chakraborti *et al*. 2016).

- The PWWC Intake Screens would be manufactured entirely of a copper-nickel alloy to inhibit attachment by zebra mussels, quagga mussels (*Dreissena rostriformis bugensis*) and Asian clams. There are three screens, and any one screen can be lifted out for inspection and cleaning, while the full raw water requirement inflows can be catered for by the other two screens. Each screen serves its own Inlet Chamber. For cleaning and maintenance purposes each Inlet Chamber can also be isolated from the other chambers, while the full flow is passing through
- While the PWWC Intake Screens would be made of a copper-nickel alloy to minimise the risk of INNS attachment, some pro-active anti-fouling measures would also be needed to protect the intake pipes from becoming clogged. The pipes would be internally coated with proprietary products to discourage INNS from attaching to the pipe wall
- The Raw Water Pumping Station pump sets would deliver into a common manifold which feeds the twin RWRMs. Each RWRM can be taken out of service for repair and maintenance, while delivering the full required flow through the other main. The pumping system is configured in such a way that not just the RWRM but each piece of pipework in the station can be accessed for repair and maintenance without interruption of supply. The design of the RWI&PS includes for 'BioBullets[9]', or INNS inhibition pellets approved for potable water usage, to be dosed into the raw water Inlet Chambers. The RWRM could be taken out of service for days or weeks, as may be required for short-term 'pigging'[10] or occasional longer-duration chemical treatment, or for creating prolonged fully-drained conditions to inhibit any INNS establishment (without having to discharge any water back to Parteen Basin).
- In order to protect from INNS infestation, it would be possible to dose invasive species control chemicals directly into the raw water using control chemicals approved for use in water treatment of potable water. Provision has been made within the Raw Water Pumping Station Building for the storage and dosing of 'BioBullets' or similar approved chemicals into the raw water
- Two microfiltration plants, one on each RWRM, housed in separate Microfiltration Buildings would provide further protection against INNS. Each microfiltration module incorporates five filter units: three duty and two standby. The microfiltration size would typically be 40 microns, which is below the size at which zebra mussel juveniles, called 'veligers', and other possible INNS larvae, are usually observed to settle. The microfiltration modules would be equipped with protective non-return valves to prevent damage from surge backflows through the units.
- Raw water would pass through each microfiltration module and dirt particles and juvenile mussels would be trapped in the unit, forming a 'filtration cake'. This cake would cause a pressure drop across the unit and a self-cleaning process would be triggered. The self-cleaning process involves the units being flushed regularly to clean away any zebra mussels or other waste material trapped in the filters. A filter flush-out pipe would carry the washwater to an INNS debris retention tank, located to the east of the Microfiltration Buildings. This washwater would be approximately 1% of the maximum abstraction volume (i.e. up to 3,000m^3/day) based on an output of 300Mld. This

[9] BioBullets are microscopic particles created by coating chemicals which are noxious to zebra mussels in a material that appears edible to the mussels. The noxious chemical is not detected and the filter feeder would continue to ingest the particles and not close down in self-defence, as they do when they detect, for example, heightened chlorine levels. BioBullets are approved by the UK Drinking Water Inspectorate (DWI) for safe use in drinking water facilities. Uneaten BioBullets degrade to harmless concentrations within a few hours of entering the water, and do not bioaccumulate.

[10] The practice of using devices known as 'pigs' to perform various maintenance operations

washwater would be subject to UV treatment to kill mussel juvenile forms (veligers) before being settled in the INNS debris retention tank. A floating-arm draw-off pipe would take supernatant liquid (the clear liquid that lies above the solid residue) from the tank and transfer it back to the intake, from where it would be pumped onwards for treatment at the WTP, thereby avoiding any discharge to the SAC. Rejected solid material settled out in the INNS debris retention tank would be removed from site to an appropriately authorised facility in accordance with the requirements of the Waste Management Act 1996 (as amended).

- Two Raw Water Balancing Tanks (RWBTs) are also proposed in the WTP, so that in the event of an INNS breakthrough, one can be taken out of service for inspection, cleaning and maintenance, while the full flow is passing through the other tank.
- The WTP treatment process itself downstream of the RWBTs would have full pH adjustment, followed by chemical coagulation, filtration, treated water pH correction, and finally UV disinfection and chlorination.
- Accordingly, the infrastructure has already been designed with the need for regular cleansing of screens and the raw water mains foreseen and it has been designed for avoidance of any discharge to the SAC in that operation.

3.5.8 Process Water Would be Treated On-site at the Water Treatment Plant

259. The proposed raw water abstraction flow was assessed as being up to a maximum of 300Mld (3.47m^3/s) at the year 2050. With recirculation of treated process water, an output of 300Mld of treated water would be achievable.

260. Options considered with regard to the management of process water were:

- Treatment of process water to a standard likely to be acceptable for discharge back to the SAC
- Treatment of process water on-site in the treatment plant, with recirculation to the RWBTs at the head of the WTP, where the treated process water would be blended with incoming raw water and returned in the main flow through the treatment plant.

261. For reasons discussed below, it has been proposed to avoid discharge of treated process water back to the Lower River Shannon SAC. Process water would instead be treated to a standard which permits return to the head of the main treatment process, allowing it to be mixed with incoming raw water and sent forward for treatment to drinking water standards.

262. There were two options considered for dealing with the volumes of process water generated during the treatment process. Option 1 was to discharge the process water back to the Lower River Shannon SAC. Option 2 was to recirculate the process water to the head of the treatment works. Both options would require treatment of the process water before discharge or recirculation.

263. Discharging process water from the WTP site to Parteen Basin would require the following works:

- Construction of a treated process water header tank
- Construction of a discharge pipeline from the header tank to the intake works site
- Construction of a Wastewater Holding Tank at the Raw Water Intake works site and a Pumping Station to pump the discharged treated process water into Parteen Basin
- Construction of an outfall pipe and diffusers into the Lower River Shannon SAC.

264. Option 2 was recognised to require six log credits[11] for removal/inactivation of Cryptosporidium and Giardia in the treatment process provided. The proposed main treatment process of coagulation, flocculation, clarification and enhanced filtration (turbidity less than or equal to 0.1 Nephelometric Turbidity Unit (NTU) for at least 95% of each filter cycle, etc.) would provide up to four log credits; the additional log credits required in the case of recirculation of process water (minimum 2.0) would have to be provided through ultraviolet (UV) treatment. It is proposed to provide settlement tanks and UV treatment on the process water recirculation line.

265. In assessing the options, the following assumptions were made:

- The level of treatment that the discharged process water would receive before discharge to Parteen Basin would be no greater than the treatment the re-circulated process water would receive under Irish Water's Design Specification: Treatment of Water Treatment Plant Residuals Document No: IW-TEC-900-07 (Irish Water 2017)
- The process water could be discharged into the Lower River Shannon SAC at the intake works site, on the downstream side of the intake points.

266. The re-circulation option was found to have lower life cycle costs than the discharge option and would avoid any potential impact on the SAC from discharge of process water. Option 2 was accordingly selected.

3.5.9 Access Road to WTP Realigned to Avoid Footprint in SAC

267. As mentioned, the proposed WTP is located in the townland of Incha Beg in County Tipperary, approximately 2km east of the RWI&PS site and 2.6km north-east of the village of Birdhill, County Tipperary. The proposed access road to the WTP approaches the site from the south, connecting the site with the R445 (formerly the N7 main Limerick to Dublin Road) and crosses open farmland and forested land. The route has been positioned to avoid the boundaries of the Lower River Shannon SAC. However, the route does cross Knockadromin Stream (WCX002; a tributary of the Kilmastulla River), approximately 35m upstream of the Kilmastulla River and Lower Shannon River SAC, and two drainage ditches (WBP221 and WBX004) approximately 150m and 195m upstream of the Kilmastulla River and Lower River Shannon SAC. There are no steep gradients along the route. The first 200m to 250m of the proposed route from the R445 would have to be raised above the flood plain of the Kilmastulla River and four box culverts incorporated into the raised section to allow flood waters to pass under the access road in times of flood to ensure there is no obstruction to water flowing across the floodplain.

3.5.10 Drainage Design on WTP to Maximise Rainwater Harvesting from Roofs and Attenuate Flows from Other Surfaces, to Minimise Surface Water Discharge to Kilmastulla River and the Lower River Shannon SAC

268. Building roofs and tank covers would account for approximately 55% of the impervious area of the WTP site. Rainfall runoff from these particular surfaces is considered to be of sufficiently consistent quality to be harvested as a source of raw water. Therefore, roof and tank cover runoff would be collected in a dedicated, separate pipe network which would outfall into the Tank Draindown Management and Commissioning Lagoons and would ultimately be pumped to the RWBTs. The lagoons and the associated return pumping system have been appropriately sized for the probability of extreme rainfall events (1 in 100-year return event with 30% allowance for climate change) occurring concurrently with commissioning or operational requirements.

[11] One log credit reduces by a factor of 10; six log credits reduces by a factor of one million.

269. It is expected that approximately 145,160m^3 per year of runoff from roofs and tank covers would be harvested annually for recirculation through the treatment process. Harvesting rainwater in this manner would reduce stormwater runoff from the WTP site that would otherwise have to be managed, and it marginally reduces the volume of pumping and energy required from the RWI&PS.

270. General site surface water runoff would be taken to an attenuation pond in the south-eastern corner of the WTP site. Runoff entering the attenuation pond would pass through an oil/petrol interceptor. A flow control device on the outlet of the pond would limit discharge stormwater flow leaving the pond to a maximum of 239l/s, equivalent to the greenfield runoff from the WTP site as a whole. The flow would then be conveyed by a 600mm diameter stormwater drain running along the route of the WTP access road to discharge into the drainage ditch (WBX002) crossed by the proposed access road approximately 220m north of its junction with the R445.

271. The Commissioning Lagoons and the associated return pumping system have been appropriately sized for the probability of extreme rainfall events (1 in 100-year return event with 30% allowance for climate change in accordance with a High End Future Scenario (HEFS) set out in '*Flood Risk Management: Climate Change Sectoral Adaptation Plan*' (OPW 2019)) occurring concurrently with commissioning or operational requirements.

272. The WTP access road, and other paved areas have been designed to incorporate SuDS principles as recommended in the SuDS Manual (CIRIA, 20015) in order to limit discharges from the site to the equivalent green field site flow rate. As part of this drainage strategy the CWSTs would have a 'green roof' on top which would have a biodiversity benefit as well as reducing the speed of surface water runoff. The general site surface water runoff from internal roads would be taken to an attenuation pond in the south-eastern corner of the WTP site. Runoff entering the attenuation pond would pass through an oil/petrol interceptor. Foul wastewater generated on the WTP site, which is estimated at approximately 1m³/d in normal operation and 2.4m³/d with visitors to the site, would be tankered from a wastewater tank installed at the WTP to a licensed Wastewater Treatment Plant.

3.5.11 Adjustment of ESB Abstraction

273. ESB manages water levels on Lough Derg and controls the water levels on Parteen Basin by diverting water to Ardnacrusha Power Station for the production of zero carbon electricity, and by opening gates at Parteen Weir to release water down the old course of the River Shannon. The water levels on Lough Derg are managed within a Normal Operating Band 460mm (18 inches approximately) in depth, across a wide range of flows. Water levels on Parteen Basin are managed within an upper and lower level for dam safety purposes. Section 4.1.1 provides further details.

274. As previously noted, ESB will facilitate the proposed abstraction of water by the Proposed Project within its current operating practices. As part of an overall agreement with ESB, water will be diverted to the Proposed Project abstraction from the flow that would otherwise have been used for electricity generation on a continuous year-round basis. At a practical level, this will mean that ESB, in keeping the water level within the Normal Operating Band on Lough Derg and within the upper and lower water level on Parteen Basin, will take account of, and respond to, the volume of water abstracted for the Proposed Project, alongside other relevant considerations such as, maintaining statutory compensation flow of 10m^3/s down the old Shannon channel, predicted rainfall, the demand for power and operating practices. ESB will maintain the water levels within the Normal Operating Band on Lough Derg and within the upper and lower water levels on Parteen Basin, as it does currently. Over longer periods there would be a generalised adjustment of the flow going to Ardnacrusha by ESB to respond to the volume of water used by the Proposed Project. However, the operation of Lough Derg, post works, will feel and look very similar to the way it currently operates, and there will not be a visible day to day difference.

275. In flood conditions, the ESB can operate Ardnacrusha at full capacity as they have done in the past, and the Proposed Project abstraction flow would be provided from the Lake storage resulting in a lowering of the water level compared with baseline flood conditions.

276. In drought conditions, if the water flowing into Lough Derg reduces sufficiently, ESB will cease power generation, and the minimum statutory compensation and fish pass flows are prioritised over the use of water by Ardnacrusha. In these circumstances the abstraction by the Proposed Project would be provided from the Lake storage resulting in a lowering of the water level compared with the baseline drought conditions.

3.6 Construction Activities

3.6.1 Settlement Basins at the Raw Water Intake and Pumping Station for Dewatering during the Construction Phase Designed to Capture Entrained Sediment

3.6.1.1 Dewatering during the Construction Phase at the Raw Water Intake and Pumping Station

277. The main substructures on the RWI&PS site, namely the Raw Water Intake and Pumping Station, the RWRM Scour Tank and Microfiltration Buildings, and the INNS Debris Retention Tank would all be constructed within secant piled walls.

278. In order to construct the secant pile walls a shallow guide wall would first be constructed at ground level around the perimeter of the underground structures, to set out the position of the secant piles. The primary piles would then be formed by first drilling a series of boreholes into the ground down to the bedrock level at every second pile location and then filling the boreholes with concrete. Once the primary piles are cast an augur would cut and remove the soil between the primary piles. A steel reinforcement cage would be lowered into the secondary borehole and then it would be filled with concrete to form the secondary pile, which intersects with the primary piles, as shown in Diagram 3.1, to form a continuous structure. This process would be repeated around the perimeter of the structure until the secant pile wall is complete. The area within the pile wall would then be excavated and the Raw Water Pumping Station substructure can be constructed. Continuous dewatering facilities would be provided until the structure is watertight. The dewatering water would be passed through a silt buster prior to discharge.

279. This secant piled wall method of construction would be used for all of the building substructures. The sequence of the construction for these would be the Raw Water Intake Chamber and Raw Water Pumping Station substructure first, then the RWRMs Scour Tank and Microfiltration Buildings basements, and finally the INNS Debris Retention Tank.

280. The shoreline would be stabilised using a sheet pile retaining wall, north and south of the Intake Chamber. The overburden at this location would be pre-augered to facilitate installation. Following pre-augering the sheet piles would be driven to still material. When the sheet piles are in place a capping beam would be cast along the top of the retaining wall.

281. All of the underground structures inside the secant piles would be constructed with in situ reinforced concrete. Superstructures would be constructed with structural steel frames, blockwork and cladding. The twin 1,500mm rising mains would be laid sequentially as working areas become available, working from the Pumping Station through to the Microfiltration Buildings and RWRM Scour Tanks and on to the Flow Meter and Swabbing Chambers.

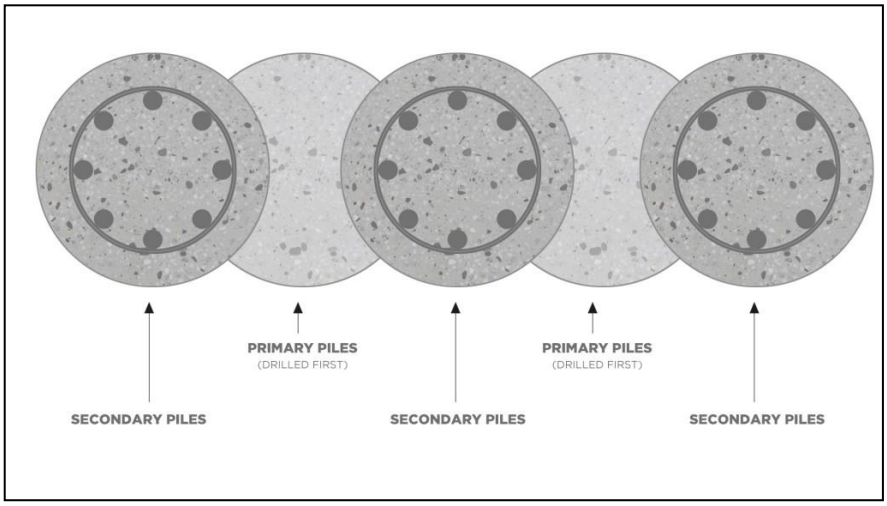


Diagram 3.1: Secant Pile Wall Construction



Image 3.3: Construction in Deep Excavation using Secant Piled Wall

282. A temporary piling platform would be constructed in Parteen Basin to accommodate the placing of the secant piles along the existing shoreline in constructing the Intake Chamber. This platform would be removed once the substructure has been constructed. A double row of heavy-duty Type 3 silt curtains would be placed around the construction area to prevent silt from entering the main Parteen Basin body of water.

283. Dewatering of all excavations would be required to ensure dry working conditions. The proposed design would exclude shallow inflows from the permeable sand horizons. Based on the permeability testing undertaken in the bedrock, the permeability ranges from 2 x 10^{-7}m/s to 9 x 10^{-8}m/s. The findings of permeability tests at the boreholes on the RWI&PS site indicate dewatering flows of 5 to 15m^3/hr need to be catered for on the RWI&PS site.

284. The appointed Contractor would be required to maintain pumps in any deep excavations, and these would pump water that enters the excavation into two lined Dewatering Settlement Basins operating in sequence. The Dewatering Settlement Basins would have the estimated dimensions and volumes shown in Table 3.4.

Table 3.4: Estimated Dimensions and Volumes of Dewatering Settlement Basins

Basin No.	Total Length	Width	Average Water Depth	Volume
1	55m	15m	1.5m	851m³
2	153m	15m	1.5m	2,606m³

285. The retention time of water within the Dewatering Settlement Basins would be in excess of 24 hours, allowing particles to settle. The TII Drainage Design for National Road Schemes - Sustainable Drainage Options (NRA 2014a) recommends a 24-hour retention time in sizing sedimentation ponds for control of pollution. This capture of fine material would be further enhanced by filtering the water through fine mesh textile fabric before pumping the settled water back to Parteen Basin. The second of the Dewatering Settlement Basins would drain through Oil Interceptors to a temporary pumping station from where the settled water would be pumped back to Parteen Basin above the flood level of 31.30mAOD (34.0m Poolbeg). The CIRIA publication Design of Flood Storage Reservoirs (1993) sets out a basis for calculating the trap efficiencies in sedimentation ponds for suspended particles in water, based on the depth of water in the ponds, the retention time in the pond, and the settling velocity of the particles. Based on a flow of 100m^3/hr, retention time of 24 hours, water depth of 1.5m, and settling velocities of particles from coarse to fine, it is calculated that particles would settle out of suspension as shown in Table 3.5.

Table 3.5: Trap Efficiency of Sedimentation Ponds

Particle size	Trap Efficiency	Length of Pond within which Settlement would occur
Coarse Silt (0.06mm)	14,235%	1.07m
Medium to Fine Silt (0.008mm)	253%	60.50m
Fine Silt (0.006mm)	142%	107.50m

286. The capture of fine material and filtering of water would ensure that all settled water pumped back to Parteen Basin would be within the prescribed water quality limits (i.e. ≤25mg/L total suspended solids in accordance with the Quality of Salmonid Waters Regulations (1988).

3.6.2 Installation of Pipeline

287. In advance of any construction works commencing along the Construction Working Width, pre-construction advanced works would include the following:

- Demarcation of the Construction Working Width with appropriate fencing and provision for access
- Identification of any existing drainage, and measures to ensure connections are maintained, or temporary solutions implemented, during construction works
- Identification of all existing services (e.g. water to troughs) and measures to ensure they are maintained.

288. Following excavation of the trench, the pipe bedding layer would be prepared (native excavated material as backfill). Initially the three or four lengths of pipe are welded together outside of the trench and then lifted and lowered into the trench with side booms/excavators. Once the pipe is in the trench, the ends of these longer lengths of pipe are welded together to form a continuous string. The trench would be kept free of water through the use of temporary pumps, as necessary.

289. Trench backfill would commence as soon as possible after pipe installation – typically the same day or next day. Depending on the quality of excavated material, it may be screened to ensure that stones and debris do not impinge on the pipeline. Native excavated material would be used to surround the steel pipe, which would avoid the impact of importing large quantities of suitable bedding material and the consequences of removing surplus excavated material. If this is not feasible due to the condition of the excavated material, then suitable material would be imported for the bedding and backfill around the pipe. Once suitable material is generated or imported it would be carefully placed around and over the pipeline to the required level.

290. The reconnection of land drains temporarily altered during construction would be carried out as part of the backfill operation. After the installation of the pipeline, the backfill would be compacted in layers up to the underside of the severed drains which are to be permanently reinstated. The replacement drain would extend into the undisturbed ground on each side of the trench for a suitable distance to ensure a properly supported reconnection can be made (typically 1m or more). The undisturbed ground would be excavated by hand and a good connection formed to the existing drain. The pipeline trench backfill would then be compacted up to the subsoil surface level.

291. Excavated material would be spread over the Construction Working Width, wherever practicable, to reinstate to the pre-existing levels allowing for settlement of disturbed material; surplus excavated material, which would be the much greater part, would be removed off site to a licensed facility.

292. Once laid, the engineered rise and fall of the pipeline along its longitudinal length would generally follow the existing ground profile to limit depths of excavation. The pipeline would be laid at a minimum depth of cover of 1.2m above the crown of the pipe. Depths of excavation generally do not exceed 6m, except where peat is encountered where the maximum depth of excavation has been constrained to 4m. However, at watercourses and trenchless crossings (Section 3.6.2.2) the depth of cover may exceed these depths as required by the local site conditions/constraints.

3.6.2.1 Working in Peat

293. In areas of land along the route of the pipeline where peat could be encountered it is expected that a slightly different construction method would be used based on the depths of peat that might be expected to be encountered and the experience of Bord na Móna in traversing these areas, as outlined herein and described in more detail in EIAR Appendix A5.3 (Methods of Working in Peat).

294. There is approximately 53km of the pipeline construction which would be within areas identified as peat soils. Approximately 47km of this has been verified by Teagasc data and GI data albeit that inferences have had to be drawn for lengths of up to around 150m of the alignment of the Proposed Project from individual points of GI. A further 5.4km is based on GI only.

295. Approximately 16km of the alignment in peat soils would be peat of less than 500mm in depth. A further, approximately, 14km would be more than 500mm but less than 1m in depth. Therefore, around 30km of the 53km in peat soils is in a depth of soil less than 1m which would generally have been drained and the construction approach to be adopted would be very similar to the general construction for the rest of the pipeline.

296. Of the overall 53km, there is approximately 23km of deeper peat and this is generally within areas of land that have been subject to peat extraction, including 18km through Bord na Móna lands.

297. Four different methods have been set out in EIAR Appendix A5.3 (Methods of Working in Peat) and the selection of which of those methods to be used for each section of the pipeline would be undertaken during detailed design. These decisions would be based on the depth of the peat and the conditions on site at the time of construction.

298. Method 1 would be employed where the extent of the peat (and any underlying marl) is less than circa 1m below the starting ground level. The peat would be removed down to firm ground which would then form the base for both the construction road and the pipe trench. Two or three 13.5m long steel pipes would be welded together at ground level beside the trench. The pipe would then placed in the trench and the string immediately welded in a ‘bell pit’ to the previous string that is already in the ground. A ‘bell pit’ is a short length of trench that is dug deeper to allow the welders access to the underside of the pipe joint in the trench. The existing Construction Working Width would be adequately wide to accommodate the additional excavation width for bell pits. Concrete collars, if required based on groundwater level, would then be placed over the pipeline adjacent to the joint, sufficient to prevent flotation. The processed

recycled substrate material would then be placed and compacted as side fill and surround up to the original level of the substrata. Finally, the excavated peat would be replaced around and over the pipe up to the original ground level.

299. Method 2 would be employed where the extent of the peat (and any underlying marl) is less than circa 2.5m but greater than circa 1m. The only difference here is that the construction road would be constructed as a floating road on top of the peat. As for Method 1, the substrata would be exposed and the pipe laid in or on the substrate bedded on recycled material. Collars would be placed at the joints to prevent flotation, where required. There is no requirement to increase the Construction Working Width to accommodate Method 2.

300. Method 3 would be employed where the extent of the peat (and any underlying marl) is greater than circa 2.5m below the starting ground level but less than circa 4.5m. The access road would be by way of a floating road. The trench would be dug to receive a single pipe string (either two or three lengths of 13.5m long steel pipes). The substrata below the peat would be exposed only at the pipe ends where a column of stone would be placed on the firm ground and levelled off to support the pipe and ensure it is at the correct grade. The majority of the pipeline would be laid in the peat and the peat would be immediately replaced as bedding, surround and backfill. The gradient of the pipe would be maintained solely by the stone columns at each joint. Bell pits would be required at every second or third joint and this would dictate the placement of the stone in two phases to facilitate support for the pipe while allowing access underneath for welding and coating. The stone would also provide the means by which the collars are prevented from rotating and falling off the pipe. There is no requirement to increase the Construction Working Width to accommodate Method 3.

301. Method 4 would be employed where the peat (and any underlying marl) is deep (>circa 4.5m) or particularly unstable. Twin concrete piles would be driven at 13.5m intervals along the pipe centreline from equipment on the floating road. An excavation would then be made around the piles and the piles would be cut off at the correct height to achieve the desired gradients and levels on the pipe and a pre-cast pipe saddle would be affixed to the top of the pile. Pipe welding would take place at surface level and when the pipe string is ready, the remainder of the trench would be excavated between the piles and the pipe lifted into place on to the saddles with the sockets of the pipe rest near to the saddle. The piles would prevent the pipe from sinking and resist lateral movement arising from un-even ground pressure caused by construction activity. Pre-cast concrete collars would then be fixed around the pipe and attached to the saddles such that the combined weight of the saddle and collar is sufficient to prevent flotation. Typically, the pipe string would contain three pipes at 40.5m in length, though it is noted that the string length is dependent on installation equipment and techniques used by the appointed Contractor. It may be necessary to reduce the length of the pipe section to account for propping of the trench box/sheet piling where this is required. A bell pit would be situated at every 2nd or 3rd pipe to accommodate safe conditions for pipe welding. The excavated peat would then be replaced around the pipe. Washout Valves would be offset from the pipeline, though they would share the same invert level as the pipeline. Additional piles would be required to support the Washout Valve and any outfall, where these features are also located in areas of deep peat. The type and length of the piles would be dependent on the depth of peat and the nature of the substrata and would be decided during detail design. There is no requirement to increase the Construction Working Width to accommodate Method 4.

302. Similar to the typical Construction Working Width, a surface water filter drain would be used to intercept land drainage and direct it away from the trench towards the settlement lagoons. Filter drains would be sited depending on the adjacent topography and may be located either side of the Construction Working Width, or not at all, would be temporary and removed on completion of the Proposed Project.

303. Following completion of the construction works the general principle is that the areas of peat would be reinstated in a manner consistent with the Bord na Móna Peatland Climate Action Scheme (PCAS

rehabilitation plans), where such plans exist or, where there are no such plans the land/peat would be reinstated on a 'like for like' basis. The aim is to get the post-construction conditions back to the pre-construction conditions in terms of the material and the drainage arrangements.

304. This would mean that the excavated peat material would be used to backfill the excavation around the pipeline in approximately same layers and depths that it was excavated from. The reinstatement would include going over the top of the pipeline. Hydraulic connectivity would be reinstated over the top of the pipe, where it existed prior to construction, and this would include reinstating permanent drainage and drain blocks over the top of the pipe in order to reinstate the drainage back to the condition that existed pre-construction.

305. In many areas the peat has already been worked and so is already degraded or cutover. However, there would be sections of degraded raised bog habitat (non-Annex) that would be affected by the works. Excavating the peat, storing it and reinstating it would affect the integrity of the peat and result in some degradation and therefore, as part of the reinstatement additional measures would be employed including:

- Ditch/gully blocking
- Ditch reprofiling
- Removing any scrubs/trees and/or ground smoothing
- Surface bunding.

306. Suitable surplus excavated peat materials would be used as part of PCAS rehabilitation plans. Agreement has been reached, in principle with Bord na Móna that surplus material can be re-used within their lands. Material would only be re-used within the bog that it was excavated from.

3.6.2.2 Open Trench and Trenchless Construction

307. The installation methods for the buried pipelines would be either via 'open cut' or 'trenchless' techniques; for the most part, the pipeline would be installed via 'open cut'.

308. 'Open cut' crossings of watercourses would be via 'damming and fluming' or 'damming and pumping'. In the former, the water is temporarily dammed upstream of a crossing and then channelled into a conduit (a pipe) of a diameter and length appropriate to the river being diverted. In the latter, the water is also temporarily dammed upstream of the crossing but is then 'over pumped' i.e. it is pumped from the dammed section to a section downstream of the crossing. In both cases, the objective is to create a dry riverbed, under which a pipeline can be laid. Once installation is complete the dams are removed and the river is returned to its previous state.

309. Trenchless crossings at major roads, railways, canals or watercourses would use pipe jacking. This is a form of micro-tunnelling method that installs a pipe behind the 'tunnel face' by pushing or 'jacking' pipes from a drive shaft or jacking platform. Pipe-jacking requires shafts to be excavated on either side of the crossing; one is the drive, or launch, or 'jacking' shaft and the other is the receiving or reception shaft. The shafts and tunnel drive are deep to ensure they are a suitable distance under the obstacle being crossed. A system of groundwater management is installed to provide a suitably safe and relatively dry working environment in a deep excavation. Measures to manage water during such installations are discussed in Section 6.

310. Open-cut trenching would be carried out with plant such as excavators, as appropriate to the identified soils and ground conditions. Spoil from the trench would be stored adjacent to the excavation at a suitable distance from it on the opposite side of the trench to the stockpiled topsoil and subsoil reserved for reinstatement. Care would be taken to ensure that gaps are left in the stockpiled excavated material to permit the maintenance of landowner corridors, surface water management and beneath overhead

cables. Before trenching commences, dewatering of groundwater may be required to ensure safe working conditions. The trenching operation would be conducted only once the pipeline installation and backfill crew are ready to install the pipeline in that location to minimise the duration that the trench is open for, which at any given location may only be one to three days.

3.6.3 38 kV Uprate Works

311. The proposed works associated with the uprating of the existing 38 kV line during the Construction Phase of the Proposed Project are detailed in EIAR Chapter 5 (Construction & Commissioning). A summary of these proposed works is provided herein in Section 3.6.3.1 to Section 3.6.3.9.

3.6.3.1 Substation

312. As mentioned in Section 3.4.1.1, the works required at the existing Birdhill 38 kV Substation are largely internal to the existing Birdhill station to include the following standard civil and electrical engineering work:

- Site clearance and removal of existing poles (to be replaced with new poles)
- Provision of one new 38 kV Gas Insulated Switchgear modular building, maximum 4.8m high and comprising 28m^2 of floor area
- All site works including internal access road and new 2.6m high palisade fence
- Provision of all site services including lighting and drainage.

3.6.3.2 Crossarm and Fittings Replacement

313. Under the uprating works associated with the Proposed Project, the existing line is to be restrung with a new conductor. In order to facilitate the restringing of the existing line, new fittings would be required to be installed on every structure. These fittings allow the clamping and isolation of the conductors to the crossarm and structures, and comprise small equipment components.

314. The fittings and equipment required would be transported by a tracked quad bike to the poleset location. Where space allows, a Mobile Elevated Work Platform (MEWP) may be used to lift the workers to the required working height. Where the space is limited, the construction workers would manually climb the pole where fittings need to be replaced. Construction activities would be of a manual nature only with pulleys and chains being used and no heavy equipment is required.

315. Crossarms link the structures and the fittings. The conductors are attached to the crossarms. The typical equipment that is required for crossarm replacement includes a 4x4 vehicle, MEWP, quad bike/buggy, tracked excavator, chains and other associated tools.

316. Access to the structures for crossarm and fittings replacement would follow the access routes identified by the Project Team. ESBN would use existing farm entrances and tracks and/or tracking across farmland where land conditions are suitable. Access to structure locations would be carefully selected to avoid likely significant effects on the surrounding area.

317. For structures requiring replacement of crossarms and fittings only, the following typical sequence of construction activities would occur:

- A low ground-pressure tracked excavator would travel directly on the ground, where the ground is suitable and agreed with the landowner, from the nearest public road or farm track road access point. In unsuitable ground conditions or sensitive areas the tracked excavator would lay a bog mat in front of it along the route to the construction site
- Where necessary, e.g. on very wet land, additional bog mats would be placed around the structure to accommodate the MEWP, 4x4 vehicle and quad bike/buggy

- MEWP used to facilitate disconnection of conductor from existing fittings and to remove the existing crossarm from the structure
- New crossarm attached to the existing structure and new fittings are attached to the crossarm with the pulley wheels to allow subsequent stringing of new conductor
- Attachment of existing conductor to the pulley wheel
- All materials and equipment removed from the site
- Any bog mats used would be left in situ until stringing of that section is complete.

318. Clear span bridging would be used to cross small streams and large drainage features, where necessary. These would be installed using a tracked excavator to lift the preformed temporary clear span bridges into position. This would only occur where the tracked excavator can work off the existing road or existing farm track network.

3.6.3.3 Wooden Poleset Replacement/New Wooden Poleset

319. Where a wooden poleset is being replaced or new wooden poleset being installed, the crossarm would either be reused, or new crossarms and fittings would be used. In some instances, the stays used to support the wooden polesets would also be replaced.

320. The replacement or installation of a wooden poleset requires the transportation of two wooden poles, crossarms and fittings to the construction site immediately adjacent to and in line with the poleset to be replaced or existing alignment of the OHL. These would be brought to site by a low ground-pressure tracked excavator along the access track. Each pole would be buried to a depth of about 2.3m in the ground.

321. Excavation for each individual pole would be carried out using a tracked excavator. The average working area for erection of a wooden poleset would extend 15m all around the footprint of the base of the poleset. Each of the two poles are lined up with the excavated holes and the machine operator then drives forward, pushing the pole up until the pole is in an almost vertical position. The pole never passes through the point of balance in the vertical position. The pole is supported at all times while the excavation is backfilled using a smaller tracked excavator. Prior to erection, a new crossarm, where required, is attached to one wooden pole.

322. A 0.8m deep trench is also required perpendicular to the direction of the line to install wooden sleepers. These sleepers add additional stability to the poleset and are attached to the poles using a U-bolt. The two installed poles are connected near the top by the steel crossarm from which three insulators are attached.

323. Where replacement of stays is required, these would be anchored into concrete or wooden stay blocks which are buried underground to a depth of about 1m.

324. In case of replacement polesets, the old poleset would either be cut down to 0.5m below ground level (bgl) or the structures lifted out of the ground. All old equipment would be removed from site in the same manner as new equipment is brought to the site and would be returned to the ESBN Depot at Rosbrien Road for future reuse or disposal as waste in accordance with existing procedures at the depot.

3.6.3.4 Angle/End Mast Erection/Replacement

325. Prior to undertaking any works at angle/end mast steel structures, it would be necessary to detach the conductor from the existing structures. The conductor would be disconnected from the mast and connected to temporary poles erected adjacent to the location.

326. Temporary poles would be erected in the same manner as the replacement/new wooden poles and may be stayed in position, depending on ground conditions.

327. Once the body of the existing angle mast has been restrained (braced to the bucket of the excavator), the legs would be cut at ground level using a specialised saw. Once all four legs have been cut, the mast body would be removed from the foundation. It would then be dismantled, and the steel members removed off site to the ESBN Depot for appropriate recycling or reuse as appropriate.

328. An excavator would then excavate around the existing foundation blocks so that they can be removed. A rock breaker attachment would be used to break out the foundation, and a tipper lorry would be used to transport the waste concrete material from site for disposal to an appropriate licensed facility.

329. Following removal of the old foundations, the locations of the new foundations would be set out by a surveyor before excavation. An excavator would excavate each of the four foundation bases to the required dimensions (approximately 2.3m x 2.3m x 2.3m) and formation level. Excavated material would be segregated into topsoil and subsoil, and stored on bog mats for future backfilling.

330. Following the installation and curing of the new foundation, a mobile crane is used to erect the body of the angle/end mast. The mobile crane would operate from a suitable location and, if required, bog mats would provide a platform for the crane around the structure base. Mast sections are assembled on the ground adjacent to the foundation, lifted into place and fixed using bolts.

331. Access to and from the sites of angle/end mast replacement works would be as per Section 3.4.1 and following the agreed access routes as previously discussed, where relevant.

3.6.3.5 Stringing of Conductor

332. Stringing of OHLs refers to the installation of phase conductors (line part) on the structures supporting the distribution line (poles). The proposed 38 kV Uprate Works involve restringing the entire route with new conductors. Stringing occurs in straight sections, typically up to a maximum of 2km, between structures with each section completed before the next section is started.

333. The methodology involves connecting the new conductor to the existing conductor using stringing stockings (see Image 5.47 in EIAR Chapter 5: Construction & Commissioning) and using the existing conductor as a pilot line. The new conductor is then pulled from the start of the section to the finish through the pulleys mounted on the structures. The use of the existing conductor as a pilot line minimises the potential for ground disturbance as installing a dedicated pilot line would require stringing from structure to structure to allow the new conductor to be pulled through.

334. The conductor is kept clear of all obstacles along the straight section by applying sufficient tension. Certain obstacles along a section would have to be guarded such as road/railway crossings and other transmission or distribution lines. Temporary poles may have to be installed to support the protective equipment. Once the new conductor is connected to the new or replacement structures, the temporary poles are then removed.

335. The average duration of stringing works is typically two weeks per straight section and does not vary significantly with the length of the straight section as the most time-consuming aspect is involved in the movement and setup of the stringing equipment. Construction crews may be up to 15 persons.

336. Access routes for the stringing equipment would follow the same access routes as for fittings, crossarm and poleset replacement. Additional bog mats and platforms would be used to access the stringing locations adjacent to the structures, as required.

3.6.3.6 Guarding of Conflicts

337. Stringing of the conductor would result in the conductor crossing over existing LV or MV distribution lines, public roads or farm tracks. In such cases, 'guarding' as shown in Image 3.4 is achieved as follows:

- Normally two guard poles are erected either side of the 'conflict' and at a slightly lower height than the 38 kV line structures
- The guard poles are generally erected in the same manner as the installation of new wooden polesets using similar equipment and bog matting as described previously. The guard poles must generally also be stayed with stay wire and stay blocks
- Once erected, the guard poles prevent the conductor from coming in contact with the live LV/MV lines or with vehicles using public roads or private trackways, should the conductors drop during installation. Once stringing is complete, the guard poles and stays are removed and the ground reinstated.

338. An alternative arrangement for installing guard poles upright on suitable ground involves the use of preformed concrete blocks. The concrete blocks, weighing several tonnes, are placed at the guarding locations and the guard poles are installed into the blocks. Additional concrete stay blocks are also required. The guard poles and concrete blocks are removed and the ground reinstated when stringing works are completed.



Image 3.4: Typical Guard Pole Arrangement

3.6.3.7 Underground Cable

339. A section of the southern line (Ardnacrusha – Birdhill – Nenagh Line) (east of the R494) running in a northerly direction to the Birdhill 38 kV Substation would be placed underground.

340. The undergrounding of cables would follow a well-established methodology for electricity circuits. All works would be carried out in accordance with standard approved methodologies and minimum requirements developed by ESBN.

341. Typical configurations for underground cable would consist of three cable ducts which would be installed in a trench typically measuring 0.6m wide and 1.2m deep. The trench would be excavated using a backhoe or excavator, the ducts installed, and the trench then backfilled using vibration plates and materials to roads authority specifications. At a later date, the electrical transmission and communications cables would be installed by pulling the cables through the installed ducts.

342. Underground joint bays are required typically every 600m to 800m where separate cable lengths are joined together. Joint bays for 38 kV cables are typically 4.5m by 2.0m and 1m in depth and would be completely reinstated/backfilled during reinstatement works. An example of a joint bay is shown in Image 3.5.



Image 3.5: Typical Joint Bay Construction Adjacent to Public Road

3.6.3.8 River Shannon and Headrace Crossing

343. The main watercourse crossings for the existing line are over the Headrace Canal (PSNWBX005) and the Lower River Shannon (PSNWCX004). These would be crossed by the stringing of conductors as described in Section 3.6.3.5 and would be subject to detailed design and agreement with Waterways Ireland as per ESBN procedures post planning.

344. While EirGrid (2020) identifies birds with a high susceptibility to collisions with OHLs, there is no known information/data available regarding bird collisions with the existing power lines. Nonetheless, new bird flight diverters (which are established best practice; Ferrer *et al*. (2020)) would be installed at the Lower River Shannon and Headrace Canal crossings. The markers are typically fitted on the two phases (which are not fibre wrapped) at 20m intervals staggered in relation to each other by 10m. A typical example of a spiral type bird flight diverter is shown in Image 3.6.

345. The installation of flight diverters is typically carried out by two persons; one person installing on the line and one person spotting from the ground. The installer would typically climb up the nearest pole structure and the spotter would pass up, using ropes and pulleys, the diverters to be fitted and a ‘bicycle’ for traversing the line. The installer fits the diverters on the relevant lines by travelling out along the line on the bicycle.



Image 3.6: Flight Diverters Installed on Overhead Line (Inset: Typical Spiral Type Flight Diverter) (Photo courtesy of EirGrid)

3.6.3.9 Proposed 38 kV Uprate Works and Power Connections within the Lower River Shannon SAC

346. The proposed 38 kV Uprate Works to be undertaken within the boundaries of the Lower River Shannon SAC (i.e. the only European site to be directly impacted by these works; Figure 3.3) would involve elements of fittings and crossarm and conductor replacement works on the three existing polesets within the SAC on the northern OHL (polesets 67B to 69B). Poleset 70B, which is located just outside and to the east of the SAC, would require replacement of the existing double poleset which would include a height increase of approximately 5m (based on current draft design) from 14m to 19m. The poleset heights/lengths refer to length of the wooden pole above and below ground. A depth of about 2.3m is normally allotted to the underground element of the poleset.

347. In addition, the installation of a 20 kV cable along the R494 from the Birdhill 38 kV Substation to the RWI&PS, also crosses the Lower River Shannon SAC. The 20 kV ducting would cross the Kilmastulla River (WCX077; designated as the Lower River Shannon SAC at this location) using horizontal directional drilling methods. The trenchless crossing of the Kilmastulla River would be approximately 20m in length. The level of the ducting would be 1.0m below the invert level of the river at the crossing point.

348. The power connection for the WTP, which would be taken from the existing Birdhill 38 kV Substation, would also require a trenchless crossing of the Kilmastulla River (WCX001; upstream and adjacent to the boundary of the Lower River Shannon SAC; Figure 3.2) using horizontal directional drilling. This crossing would be approximately 14m in length. It should be noted, while the boundary of the Proposed Project overlaps with the boundary of the Lower River Shannon SAC at this location, no works would take place within the SAC.

349. All poleset sites within the Lower River Shannon SAC would be accessed from existing roads/tracks and through open fields. Therefore, no habitat clearance would be required for the proposed access tracks. Ground disturbance associated with the movement of machinery and personnel along access tracks would cause a temporary disturbance to the terrestrial habitats. Temporary habitat loss would however be required along the route of the 20 kV cable, either side of the watercourse crossing (i.e. at launch and reception shafts). All ducting for directional drilling would be completed in less than 10 consecutive days

of night-time working. The launch and reception shafts would be situated outside of the riparian zone, as standard practice, therefore buffer strips of natural uncleared vegetation shall be preserved between construction activity and the watercourse crossing.

3.7 Testing and Commissioning Activities

3.7.1 Raw Water Intake and Pumping Station

350. The commissioning and test water for the RWI&PS would be taken from Parteen Basin via the intake and inlet chambers structures.

351. Following dry inspection of the Raw Water Intake, the PWWC screens, penstocks and chambers, the wet wells would be flooded, and the reprofiled area of the Parteen Basin bed, at the Raw Water Intake Basin, would be inspected by divers for integrity of the concrete revetment mats. The revetement mats would be reinspected after commissioning of the intake to ensure they remain undisturbed under maximum intake flow.

352. The microfiltration units, and the UV units on the microfilter washwater return pipes, would be wet commissioned first. Water would be delivered to the microfiltration units from the RWI&PS pump hall by a temporary pump, appropriately sized. Water run through the microfiltration units would run to waste into the RWRMs Scour Tanks, located beneath the microfiltration units buildings. This water would be returned to the raw water Inlet Chambers and recycled through the microfiltration units until commissioning of those units is complete.

3.7.2 Water Treatment Plant

353. Commissioning and test water for the WTP would be provided from Parteen Basin, via the RWI&PS and the RWRM.

354. Following cleaning and dry inspection of all tanks, penstocks and chambers, the RWBTs would be filled by forward pumping from the RWI&PS. Once these tanks are tested and passed for water tightness, the water can be used to test the individual tanks and treatment units in the plant and to commission the treatment processes themselves.

355. Initial commissioning of the WTP would be carried out incrementally and using only a fraction of the ultimate flow. The process commissioning phase would begin with a single treatment sub-stream within Treatment Module 1, using a single settlement tank with two rapid gravity filters at 50% of their design capacity.

356. Commissioning would be possible at a low rate (approximately 10Mld) and initially the water would be re-circulated through the plant. This would be done by discharging the treated water to one cell of the Clear Water Tank (CWT), and rather than pumping it forward to the BPT, it would be drained back to the Tank Draindown and Commissioning Lagoons on-site and recirculated to the RWBTs at the head of the works.

357. When the water quality has reached a sufficient standard, it would be used initially as test water for tanks throughout the WTP site, and finally the through flow would be allowed discharge to the CWT available for testing and commissioning of the High Lift Pumping Station (HLPS). For the rest of the process commissioning, flows would gradually be increased (by activating further treatment sub-streams within Treatment Module 1) until the full module is operational.

358. In the second stage of the commissioning process, the flow would be increased from 10Mld to 20Mld and flows at this level would be monitored and increased as required so that the flow from one full

treatment module would be available for the commissioning of the Treated Water Pipeline from the WTP to the BPT and the HLPS.

359. The same procedure would be followed with second and third treatment modules.

360. Having informed ESBN of a time profile of test/commissioning loads at the WTP and HLPS, the Treated Water Pipeline would be swabbed, tested, chlorinated and commissioned, and the high lift pumps would then be commissioned individually and in parallel. The WTP site lagoons have adequate capacity to store the water volume in the Treated Water Pipeline to the first local high point downstream of the WTP.

3.7.3 Pipeline Infrastructure

361. As mentioned, there are three distinct sections of pipeline:

- RWRM: c.2km
- Treated Water Pipeline from the WTP to the BPT: c.37km
- Treated Water Pipeline from the BPT to the TPR: c.132km.

362. The testing and commissioning of all the pipelines would follow the same overall procedure and sequence which is described in Section 3.7.4.

363. All along the pipelines, there are Line Valves every 1km to 7km which, once the pipeline is in operation, enable a sub-section of pipeline to be isolated, thus facilitating any planned local maintenance or emergency repairs without requiring the entire pipeline to be drained down.

364. During construction, the sub-section bounded by two Line Valves forms a logical and suitable length of pipeline for hydrostatic pressure testing to prove the leak-tightness of the pipeline. Other logical places are at intermediate road crossings or at tunnel sections.

365. The precise division into sub-sections would be determined during detailed design and in conjunction with the construction schedule of each appointed Contractor.

366. The construction of the entire pipeline may take up to three years. Therefore, to enable reinstatement to take place in a timely fashion, it is necessary that sub-sections are tested as they are completed so any remedial works can be completed whilst the appointed Contractor is mobilised in the area.

3.7.4 Pipeline Test and Commissioning Sequence

367. The sequence for pipeline testing and commissioning is as follows:

a) Initial clean and internal inspection
b) Low pressure ‘air test’ using compressed air
c) Hydrostatic pressure testing with filtered raw water
d) Final swabbing and cleaning
e) Disinfection
f) Filling with potable water
g) Water quality sampling.

368. Items (a) to (d) would be undertaken as each sub-section of up to 7km is completed.

369. Items (e) to (g) would be undertaken once the entire pipeline is complete and the HLPS, BPT and TPR are also ready for ‘wet’ commissioning.

3.7.4.1 Initial Cleaning

370. Each section of pipeline of up to c.7km would be inspected, initially cleaned and tested as construction is completed.

371. The initial clean is undertaken 'dry' and would involve the internal inspection of the pipeline and removal of all significant foreign matter by either personnel or robotic inspection devices entering inside the pipeline.

372. This would be followed by the taking of Closed-Circuit Television (CCTV) video of the section to provide a record of the cleanliness prior to testing.

3.7.4.2 Air Test

373. The air test involves:

- The capping of all flanged outlets (Air Valves and Washouts) on the test section with blank flanges
- The temporary installation of special test ends to each end of the test section designed to facilitate air testing, water testing and swabbing
- Raising the pressure of the test section to around 1 bar with oil-free clean compressed air to check for any leaks
- Investigating and fixing any leaks and retesting the section. Note, on a welded steel pipeline, most leaks are from flanged joints on ancillary appurtenances not being adequately tightened.

3.7.4.3 Hydrostatic Test

374. Upon achieving a successful air test the hydrostatic test would follow at a much higher test pressure. Hydrostatic pressure testing is an essential part of commissioning a Treated Water Pipeline. This is undertaken at an elevated pressure to stress the pipeline to prove the welded joints are able to withstand the full operating pressure. It is important to note testing with air at high pressures is not a safe practice and not permitted.

375. For practical purposes it is best to undertake testing in short lengths of between 1km and 7km whilst the approved Contractor is still mobilised on the relevant pipeline section. Once the test of a section has been successfully completed, three further elements of work can proceed:

- The pipeline section can be drained to prevent it from going stagnant prior to final commissioning
- The pipeline appurtenances (Air Valves and Washouts) can be fitted and their chambers completed
- Reinstatement of the land and subsequent hand-back to the landowners.

376. Until pressure testing is complete the hand-back of the land to landowners cannot take place.

377. Sources of water for hydrostatic testing of the pipeline for the Proposed Project are limited. The three options were considered in the development of the Commissioning Strategy (EIAR Appendix A5.2: Commissioning Strategy):

- Water from potable water mains that run near to or cross the Proposed Project pipelines
- Potable water from the WTP once it has been commissioned to provide sufficient treated water
- Raw water from watercourses close to the pipeline (treated in a temporary mobile water treatment rig prior to use for pressure testing).

378. All options require the water to be discharged through all the Washouts to local watercourses and bunds following completion of the pressure test.

379. The advantages and disadvantages of each are set out in Annex A to EIAR Appendix A5.2 (Commissioning Strategy). Raw water from watercourses was selected as the preferred source of water for hydrostatic testing for the reasons set out in Annex A.

380. The watercourses along the length of the pipeline were evaluated and smaller water bodies with Q95 flow of less than 100l/s were discounted. The term 'Q95' relates to the assessed flow in the water body and is the flow rate which is exceeded 95% of the time – meaning the assessment is very conservative and only in exceptional circumstances would water not be available. Eight water bodies were selected and are set out in Annex B to EIAR Appendix A5.2 (Commissioning Strategy). The rate of abstraction would be below that requiring an abstraction licence.

381. Annex C to EIAR Appendix A5.2 (Commissioning Strategy) sets out generic management measures to be applied to the environmental risks associated with abstraction and discharge of the water. Annex D to EIAR Appendix A5.2 (Commissioning Strategy) identifies specific risks associated with the proposed abstraction from Kilmastulla River and the River Liffey. Annex E to EIAR Appendix A5.2 (Commissioning Strategy) sets out the decision tree proposed to be used to determine the choice of discharge of the water once testing is complete. The potential impacts on European sites associated with these risks are assessed in Section 7 of this NIS.

382. The source of abstracted water would be sampled prior to hydrostatic testing and the required water treatment determined, based on a decision tree that covers:

- Suspended solids
- Invasive non-native species (e.g. zebra mussels, crayfish plague)
- Water chemistry – pH, hardness, conductivity, organics, metals, nutrients, pesticides.

383. A temporary small-scale intake design of approximately 2,000m^3/day (25l/s) would be developed, probably in the form of a suspended cage lowered into the mid-stream but not close to the riverbed to avoid drawing in aquatic species that prefer the margins. Abstraction velocities would be kept below 0.15m/s through a fine mesh screen not greater than 3mm aperture.

384. Treatment process would include filtration and disinfection as a minimum to avoid sediment, organisms and seeds entering the pipeline and be modular to allow for treatment commensurate with the abstraction rate available.

385. The treatment process would also ensure that water being discharged from the pipeline after hydrostatic testing would not cause any environmental impact. The sampling of the abstracted water would provide information regarding background contaminants and the potential for INNS and determine the exact treatment required to remove the contaminants.

386. In addition, sampling of pipeline water prior to discharge would be undertaken to verify this and to determine the treatment(s) required prior to discharge. The same treatment approach would be followed whichever discharge solution is chosen:

- Dechlorination using recommended products during discharge into settlement pond
- pH adjustment in the settlement pond
- Oxygenation on discharge from the settlement pond (if required) using an upturned bellmouth or similar arrangement.

387. A provisional assessment of pipeline sub-sections has been undertaken and suitable local watercourses identified for each sub-section. In most cases the watercourse crosses the test section and the section can be fed directly from the source. Occasionally, the sub-section for testing would require an adjacent sub-section to be completed first so that water can be conveyed to the right sub-section.

388. Following successful completion of the hydrostatic pressure test, the water in the pipeline would, where practicable, be retained and pumped into adjacent sections when they are ready for hydrostatic testing. However, in most instances the water would be drained from the pipeline as far as practicable to land within the water catchment area from which it was originally taken. Discharge would be restricted to 20% of the associated stream's median annual flood flow rate (Qmed).

389. The list of sub-sections for the Treated Water Pipeline and the associated proposed sources of water can be found in Annex B to EIAR Appendix A5.2 (Commissioning Strategy). This gives an assessment of the size of the watercourse and the provisional proposed abstraction rate.

390. Every single Washout is likely to be used during commissioning to discharge hydrostatic test water.

391. Since the pipeline would need to be left empty and capped prior to final commissioning (which may be over two years later) it would be necessary to use all Washouts to drain the sub-section completely.

392. There is no time restriction on this drain-down process and where suitable watercourses are not available, a bunded temporary soakaway area would be created within the construction corridor.

3.7.4.4 Swab Cleaning

393. Upon completion of the hydrostatic test, cleaning would be carried out by propelling foam swab 'pigs' separated by 'slugs' of potable water through pipeline sections with oil-free compressed air. Typically, two or three pigs at a time are 'blown' through with 50 or 60m³ of water in front of the first pig and similarly between the other pigs.

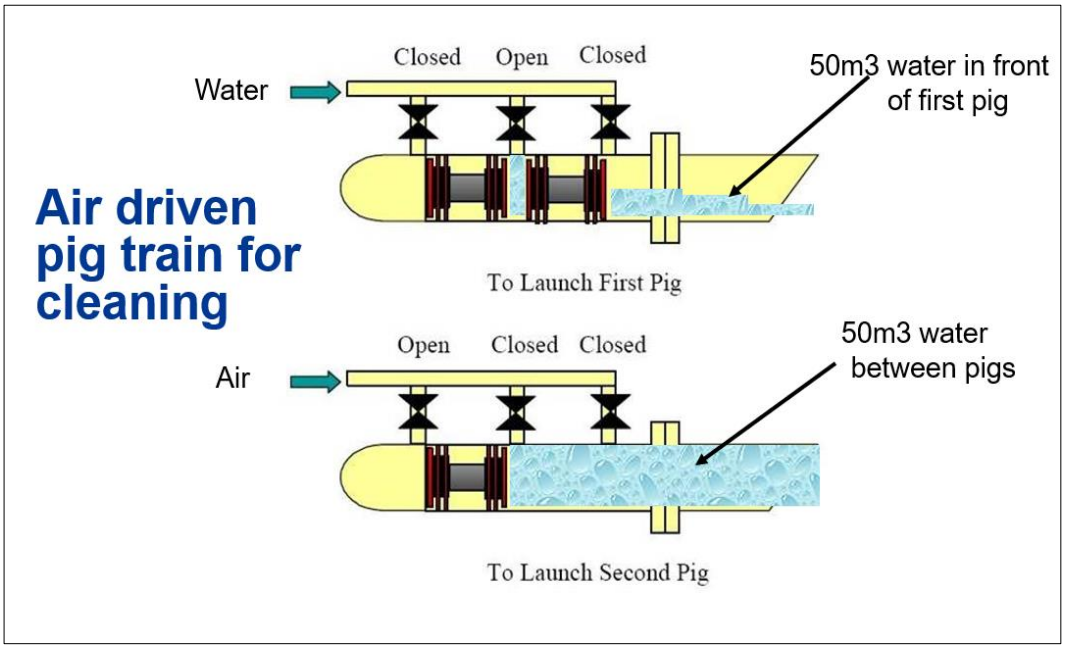


Diagram 3.2: Cleaning Post Hydrostatic Testing by Air Driven Pig Train

394. The process is repeated, as necessary, until the last pig in the pig train is visually clean and the water that precedes it, free from significant contamination.

395. The water used for cleaning would be disposed of via Siltbusters, and any additional treatment required (as discussed in Section 3.7.4.3), to an adjacent watercourse or allowed to soak away onto the land.

396. Once cleaned the pipeline would be temporarily capped and sealed.

3.7.4.5 Land Reinstatement

397. Once pressure testing and cleaning are complete for any sub-section, surface reinstatement can be undertaken.

398. Early reinstatement is the key advantage of testing in local sub-sections as it permits the return of the vast majority of the land as soon as is practicable to the owners and tenants.

399. If the chosen end points of the sub-section are adjacent to roads, then the construction road along the working width can be taken-up and full reinstatement put in hand. Otherwise, it would be necessary to retain the construction road to allow access to the end of the sub-section to facilitate making the joint to the adjacent section when ready.

3.7.4.6 Joining of Sub-Sections and 'Golden Joints'

400. When adjacent sub-sections of the pipeline have both been successfully tested and cleaned, the temporary caps on adjacent ends are removed and the two sections joined, typically by the installation of a Line Valve.

401. The joints made between two tested sections are colloquially known as 'golden joints' and would not have been subject to full pressure test. As far as possible access to these 'golden joint' locations is retained with the joints exposed so that they can be visually inspected for leaks during later commissioning.

3.7.5 Commissioning of Treated Water Pipeline

3.7.5.1 Disinfection and Filling of Treated Water Pipeline from the WTP to the BPT

402. When the entire Treated Water Pipeline from the WTP to the BPT is ready for disinfection this would also require:

- Potable water to be available from the WTP at a rate of around 150l/s
- At least one pump of the HLPS (or a temporary potable pump) to be able to deliver around 150l/s to the BPT head.

403. Disinfection would be carried out by low volume, low-pressure spraying of the internal pipe surface with a mist of sodium hypochlorite solution using a specialist spraying rig inserted through manways.

404. Spraying would work sequentially from the west between Line Valves, and filling of the pipeline with potable water from the WTP would follow as soon as practicable, whilst the next section is being disinfected.

405. In this way the entire Treated Water Pipeline would be disinfected and filled as far as the BPT.

406. A chorine residual in the pipeline (at a level to be determined) should be maintained at all times in all sections that have been filled.

407. Current estimates for the schedule are based on disinfecting around 500m of pipeline a day and would require temporary access to the wayleave to access the manways for one to two days.

408. Since it would take several months before the rest of the pipeline, BPT and TPR are ready for onward flow, to avoid the water becoming stagnant, a sweetening flow would need to be established via a suitable Washout on the easternmost section that has been filled.

409. The sweetening flow rate would be determined during detailed design and would depend on the length of pipeline filled to date, the level of chlorine used and the rate of chlorine decay.

410. As a point of reference, a turnover of the entire pipeline every 28 days would require sweetening flow of around 30l/s (3Mld) for the entire 37km long Treated Water Pipeline from the WTP to the BPT.

411. The sweetening flow would need to commence prior to the completion of the fill of the entire pipe and this would require careful monitoring of input and discharge flows, such that the rate of fill of the pipeline is within acceptable range and so the pipeline is not accidentally drained.

412. All sweetening flow discharges would be monitored for chlorine residual and dechlorinated prior to entering any watercourse.

413. As each section is filled, the 'golden joints', Air Valves and Washout would all be visually inspected to ensure there is no discernible leakage.

3.7.5.2 Pipeline Drop Test

414. Once the entire Treated Water Pipeline from the WTP to the BPT is filled:

- The sweetening flow would be temporarily stopped
- All open Washouts would be closed
- The delivery valves at the HLPS would be closed.

415. The free surface of the Treated Water Pipeline bell mouth within the BPT would be monitored over a period of 24 hours to confirm the leak tightness of the entire pipeline. The acceptance criteria would be determined during the contract formulation.

416. Once the drop test has been successfully completed, the sweetening flow would be re-established. In the case of a failed drop test, sweetening flow would be re-established until any problems had been remedied. The drop test would be repeated.

3.7.5.3 Disinfection and Filling of Treated Water Pipeline from the BPT to the TPR

417. The procedure for disinfecting and filling the Treated Water Pipeline from the BPT to the TPR would be the same as for the Treated Water Pipeline from the WTP to the BPT. Water would either come from the BPT if that had already been commissioned or via temporary bypass pipework.

418. The sweetening flow would need to be increased as the length of filled pipeline grows to ensure the time to turn-over all the water in the pipeline was less than the prescribed time period. A Washout near the end of the section furthest to the east would be used to run the sweetening flow to waste via a suitable dechlorination mechanism to achieve levels less than 0.005mg/L required by the Salmonid Waters Regulations, 1988.

419. As a further point of reference, for a turnover of the entire Treated Water Pipeline from the BPT to the TPR (170km) every 28 days, a sweetening flow of around 140l/s (12Mld) would be necessary.

3.7.5.4 Pipeline Drop Test

420. Once the entire Treated Water Pipeline is filled as far as the TPR:
    - The sweetening flow in the Treated Water Pipeline from the BPT to the TPR would be temporarily stopped (it can continue within the Treated Water Pipeline from the WTP to the BPT)
    - The valves at the TPR would be closed
    - All Washouts on the Treated Water Pipeline from the BPT to the TPR would be closed.

421. The free surface of the Treated Water Pipeline outlet bell mouth within the BPT would be monitored over a period of 24 hours to confirm the leak tightness of the entire Treated Water Pipeline.

3.7.5.5 Water Quality Testing

422. Water quality samples would be taken all along the pipeline length to ensure compliance with potable water regulations.

423. Any gross failures need to be investigated thoroughly through further sampling at air valves to pinpoint the problem. In a worst case, a section may need to be drained (as described in Section 3.8 and Section 5.2.1.2) and CCTV cameras (or personnel entry through manways) used to investigate the source of the problem.

424. Minor failures may be remedied by adding a higher chlorine dose and/or flushing the section in question to a watercourse (dechlorinating as necessary) and replenishing with fresh water from the WTP via the previous sections (see Section 3.8 and Section 5.2.1.2).

3.7.5.6 Line Valves

425. Line Valves would be installed and the power supply from ESBN connected.

426. Each valve would be tested (i.e. from fully open to fully closed) both locally and remotely via the SCADA system with the bypasses open.

427. Each valve installation also includes pressure monitoring either side of the valve which would be commissioned at the same time and linked to the telemetry.

428. The time to open/close would be confirmed to be within design parameters to avoid unacceptable transient pressures.

3.7.5.7 Cathodic Protection

429. Commissioning of the impressed current cathodic protection system on the pipeline would be by specialists who would set up the appropriate voltages and currents for each section.

430. All cathodic protection ground beds are located adjacent to Line Valves and the cathodic protection would draw power from the same ESBN power supply and use the same telemetry relay station to communicate the status of the system to the central control.

3.7.6 Break Pressure Tank

431. The BPT is an integral component of the Treated Water Pipeline and cannot be fully commissioned in isolation from the other components, namely the HLPS at the WTP, and the Treated Water Pipeline.

432. In order to commission the BPT:

- Potable water would need to be available from the WTP
- The Treated Water Pipeline from the WTP to the BPT would need to be complete, pressure tested, cleaned, disinfected and filled.

433. A means of pumping water from the WTP to the BPT would be required. This does not necessarily have to be the HLPS as temporary pumps may be more expedient within the construction and commissioning schedule to use a temporary pump which can deliver the required commissioning flow rate, which may be less than a single high lift pump can deliver.

434. Initially, commissioning would consist of the following:

- Water ingress test to confirm that there are no leaks into the structure, especially through the roof. The roof of the structure would be flooded with pumped water from the Treated Water Pipeline from the WTP to the BPT. The inside of the BPT would then be examined for any water ingress
- Cleaning and disinfection of the internal structure of the BPT. Once the concrete has cured and all joints have been sealed, the internal structure would be thoroughly cleaned of construction materials, dirt and dust with high pressure water jets. Wastewater from this process would be collected in the drains and directed to Siltbusters or similar, prior to discharge. The most suitable source of water for cleaning would be determined during detailed design but would likely be water from the WTP via the Treated Water Pipeline. Once cleaned the internal surfaces of the structure would be disinfected with super-chlorinated water by either brushing or spraying
- Water retention test to satisfy the integrity and watertightness of the structure. The BPT would comprise three cells, and each cell would have to be tested independently. The maximum volume of water required to test an individual cell is around 5Ml. The same water would be used for each of the three cells, being transferred by way of over pumping. The cell would be filled to the overflow level, isolated and then left for an agreed period (not less than 24 hours) and the level re-measured. No drop in level should be observed. If this is not the case then the cause of the loss of water would be investigated and remedied and the test repeated. If is not practicable to re-use the test water to gravitate forward to facilitate hydrostatic testing of the Treated Water Pipeline from the BPT to the TPR, this water would be discharged upon completion of the water retention test through the dechlorination chamber which is to be built as part of the permanent works on the site; ultimately drained via the soakaway chambers and detention basin which forms part of the site drainage. Consequently, this discharge would be carried out at a controlled rate according to the capacity of the soakaway chamber.

435. Final commissioning would take place in conjunction with the WTP, HLPS and the Treated Water Pipeline, and would involve the following:

- All level probes, level switches, water quality monitors, Programmable Logic Controllers, Human Machine Interfaces, flow meters, valve actuators, Uninterruptible Power Supplies, alarms, security and telemetry systems would be ‘dry’ commissioned once power from the ESBN has been connected
- The tank would be filled via the Treated Water Pipeline
- All level probes, level switches, water quality monitors, flow meters, valve actuators would then be ‘wet’ commissioned.

3.7.7 Booster Pumping Station

436. The BPS can be the final element tested and commissioned. For the BPS to be tested and commissioned the Treated Water Pipeline from the BPT to the TPR, and the TPR would need to be tested and ready to accept flows.

437. The BPS on the Treated Water Pipeline from the BPT to the TPR would allow the flows to be increased from approximately 165Mld to the design maximum of around 300Mld.

438. Since the Treated Water Pipeline from the BPT to the TPR can bypass the BPS, the BPS can be constructed, connected and dry and wet tested without interfering with ongoing operations of the Treated Water Pipeline.

439. Once the BPS has successfully passed all offline testing including the necessary disinfection, it can be commissioned through the start-up sequence determined by the transient analysis.

440. During start-up, the pumps are throttled by the FCV which provides fine control between 165Mld and 300Mld.

441. Individual pumps can be operated at up to full speed for short periods against throttled pump delivery valves subject to the pump motor temperatures. In this way the individual pumps can be wet tested for start-up, shut down, vibration, and overheating without affecting the overall flow in the Treated Water Pipeline. Alternatively, pumps can be tested against the throttled FCV.

442. Similarly, once all individual pumps and the surge suppression system have been successfully tested, the combined pumped flow can be throttled to match the maximum gravity flow so there is no need to add complexity to flow control on the WTP and HLPS during the initial testing.

443. If a trip or shut down occurs during this initial testing, flows would automatically revert to the maximum gravity flow.

444. Once start up and shut down sequences have been robustly established, flow would be increased incrementally (along with required changes at the WTP and HLPS) up to the maximum design flow.

445. At all times during commissioning, close co-ordination would be required with the production output at other water treatment plants in the Greater Dublin Area Water Resource Zone to manage strategic storage levels.

3.7.8 Flow Control Valve

446. Commissioning would take place in conjunction with the WTP, HLPS, Treated Water Pipeline, BPT, and TPR. Commissioning would consist of the following:

- Once power from ESBN is connected, the Programmable Logic Controllers, Uninterruptible Power Supplies, flow meters, flow control valve, telemetry, security and alarms can be commissioned
- Each FCV would be commissioned separately and then in pairs across the full opening range
- The final commissioning can only be undertaken as part of the overall system commissioning to put the entire Treated Water system into automatic control mode.

447. As part of the testing and commissioning of the Proposed Project all control systems would need to pass the Factory Acceptance Testing (FAT) and once installed, Site Acceptance Testing (SAT). These would all be undertaken ‘dry’. This would include all comms links to the other infrastructure sites.

448. Full ‘wet’ commissioning of the FCV can only take place once the pipeline is fully charged with water. A pre-requisite of this would be the full commissioning of the RWI&PS, WTP, pipeline, BPT and TPR.

449. The three individual FCV’s would then be commissioning individually then in various combinations and finally into supply with combinations of two out of three operating to achieve the full range of flows.

3.7.9 Termination Point Reservoir

450. The TPR is an integral component of the Treated Water Pipeline and cannot be fully commissioned in isolation from the other components, namely the HLPS at the WTP, the Treated Water Pipeline, and the BPT.

451. Initially, commissioning would consist of the following:

- Water ingress test to confirm that there are no leaks into the structure, especially through the roof. The roof of the structure would be flooded with water pumped from the Treated Water Pipeline. The inside of the TPR would then be visually inspected for any water ingress
- The internal structure, once the concrete has cured (note, cured concrete pH level is typically below 9) and all joints have been sealed, would be thoroughly cleaned of construction materials, dirt and dust and the ceiling, walls and floor cleaned using high pressure water jets. Wastewater from this process would be collected in the drains and directed to silt-busters or similar, prior to discharge to the local drains or overflow tank. The most suitable source of water for cleaning would be determined during detailed design but would likely be water from the WTP via hydrants off the Treated Water Pipeline. Once clean, the internal surfaces of the structure would be disinfected with super-chlorinated water by either brushing or spraying
- A water retention test would then be undertaken to prove the integrity and water tightness of the TPR structure. The TPR structure would comprise three cells, and each cell would have to be tested independently. The maximum volume of water required to test an individual TPR cell is 30Ml. The same water would be used for each of the three cells, being transferred by way of over pumping
- Upon completion of the various water retention tests, and upon confirmation that water quality is to standard, the water may be forwarded to the existing Peamount Service Reservoir facility. Disinfection procedures would have to be implemented in the event that water quality is sub-standard. Upon satisfactory completion of testing, the retention test water would be disposed via a Washout Valve at a low point along the pipeline, which would discharge through an outlet chamber to allow for the provision of dechlorination chemicals prior to discharge. If absolutely necessary, water could be diverted to the overflow tank and tankered off-site.

452. Final commissioning would take place in conjunction with the WTP, HLPS, BPT, Treated Water Pipeline, and FCVs. It would involve the following:

- All level probes, level switches, water quality monitors, Programmable Logic Controllers, Human Machine Interfaces, flow meters, valve actuators, Uninterruptible Power Supplies, alarms, security and telemetry systems would be ‘dry’ commissioned once power from the ESBN has been connected
- The TPR would be filled from the Treated Water Pipeline under manual control from the cell inlet valves
- All level probes, level switches, water quality monitors, flow meters and valve actuators would then be ‘wet’ commissioned.

3.8 Repair and Maintenance during the Operational Phase

3.8.1 Invasive Non-Native Species Control without Impacting the Lower River Shannon SAC at the Raw Water Intake and Pumping Station

453. The zebra mussel, Asian clam and quagga mussel are INNS found in Irish watercourses, including the River Shannon, which must be prevented from clogging, and entering or inhabiting the pipeline. Methods of doing this include the use of microfiltration plants downstream of PWWC Intake Screens. The PWWC Intake Screens would be manufactured of copper-nickel alloy to inhibit attachment of zebra mussel, quagga mussels and Asian clam. This is international best practice, and experience in the use of copper nickel alloy screens has shown low levels of biofouling. The screens develop a copper oxide film within

a few hours of being submerged. Once the mature surface corrosion film has formed, the amount of released copper becomes very small, often difficult to detect by normal methods of analysis and is quickly diluted in aquatic environments.

454. Proactive non-toxic anti-fouling measures may also be applied to protect the intake pipes from becoming clogged. Internal coating of the pipes can be undertaken to discourage attachment of INNS to the pipe wall. Other possible measures may be authorised by the appropriate regulator. Those envisaged include:

- The incorporation of electrodes in the pipes within the Intake Chambers and pumping station itself, that would generate electric charges at predetermined intervals. Cathodic protection has been around for over 150 years and is widely used to prevent corrosion (such as rust) in pipework, which can be a source of environmental pollution. Anti-corrosion protection can prevent the uncontrolled release of dechlorinated water. The current would pass through the pipeline when it is buried underground, away from any harm to species
- Injecting continuous low doses of an oxidant such as potassium permanganate into the RWRMs
- Use of 'BioBullets' which encapsulate chemicals which are toxic to zebra mussel into microscopic particles, which can be released into the RWRMs.

455. These additional measures noted above (e.g. electrodes, BioBullets) may be employed as an extra precaution; however, they are not considered a necessary mitigation measure to avoid adverse effects on the integrity of any European site(s). It should be noted that these chemicals, potassium permanganate and BioBullets, are approved by the Great Britian Drinking Water Inspectorate for use in potable water applications. Furthermore, they would be injected only into the RWRMs and not into the aquatic environment. The design of the RWI&PS provides for isolated working on any chamber or RWRM, with capture of settled detritus and forward pumping of cleansing water, without release of washwater back to the aquatic environment. There is therefore no risk of any of these chemicals reaching the waters of Parteen Basin.

456. The design provides for microfiltration on the twin RWRMs. Two Microfiltration Buildings would be constructed on the RWI&PS site, each housing five microfiltration units. When in use, the units would be flushed regularly to clean away any INNS or other waste material trapped in the filters. A filter flush-out pipe would carry the washwater to an INNS debris retention tank, located to the east of the Microfiltration Buildings. This washwater would be approximately 1% of the maximum abstraction volume (i.e. up to 3,000m^3/day) based on an output of 300Mld. This washwater would be subject to UV treatment to kill mussel juvenile forms (veligers) before being settled in the INNS debris retention tank. A floating-arm draw-off pipe would take supernatant liquid (the clear liquid that lies above the solid residue) from the tank and transfer it back to the intake, from where it would be pumped onwards for treatment at the WTP. Rejected solid material settled out in the INNS debris retention tank would be removed from site to an appropriately authorised facility in accordance with the requirements of the Waste Management Act 1996 (as amended). There would be no discharge to the Lower River Shannon SAC from this intake flow process, i.e. there would be no discharge from the RWRMs or backwash of the Microfilters to the SAC. It should be noted, the intake flow process is separate from site drainage, with the exception that runoff from the roof of the Raw Water Pumping Station and Microfiltration Buildings would be harvested and re-used on site. With these measures in place (i.e. PWWC Intake Screens manufactured of copper-nickel, microfiltration, and UV treatment) there is sufficient protection to ensure INNS are not transferred or spread to other water bodies.

3.8.2 Raw Water Rising Main Draindown Water Capture to Prevent Discharge to the Lower River Shannon SAC

457. Two Tank Draindown Management and Commissioning Lagoons, each of capacity 15,000m^3, a total capacity of 30,000m^3, would be provided for commissioning purposes, drawing down of a section of a RWRM, or other water tank, acceptance of surface water, or emergency storage of washwater. Each lagoon would have an associated Pumping Station to allow the contents to be recirculated to the RWBTs.

No discharge would arise as a result of RWRM draindown operations, to any watercourse or European site, in particular the Lower River Shannon SAC.

3.8.3 Water Treatment Plant Operations

458. The water treatment process includes:

- pH correction
- Enhanced coagulant and polyelectrolyte dosing
- Flocculation and clarification
- First stage filtration (Rapid Gravity Filtration (RGF) – enhanced individual filtration)
- Second stage filtration through iron and manganese rapid gravity filters and Granular Activated Carbon (GAC) filters
- Disinfection with UV (see Section 3.5.7) and dosing of low levels of chlorine into the final water, to prevent build-up of slime in the treated water pipe.

459. Separate from the water treatment process, the plant would include facilities for the storage and dewatering of waterworks sludges, and for the settlement, treatment and return of filter backwashing water and supernatant water from the sludge stream.

460. Sludge would be produced at the WTP from the following processes:

- Coagulation sludges produced by the coagulation and settling of natural turbidity (Class 1A)
- Liquid waste produced from the cleaning of the sand filter (Class 1B)
- Granular activated carbon media would be taken off site periodically for replenishment
- Other chemical additions such as the addition of polyelectrolyte.

461. The water treatment process creates a residual waterworks sludge, as the coagulant chemical binds up the organic material into an insoluble form, which is then removed from the settlement tanks. The material backwashed from the various filtration stages also contributes to the volume of sludge from the water treatment process.

462. The sludge draw-off from the sludge blanket clarifiers/Dissolved Air Flotation (Class 1A) would drain to Sludge Balancing Tanks before pumping to picket fence thickeners. Settled sludge would also be pumped from the base of the Used Washwater Equalisation and Settlement Tank to the Sludge Balancing Tanks, before being pumped to picket fence thickeners. Picket fence thickeners enable the thickening and settlement of particles suspended in water into a sludge, which can then be removed for disposal or treatment. Their rotating blade consists of a series of vertical rods with horizontal supports, so look similar to a garden fence.

463. Sludge from the picket fence thickeners, at typically 1-3% dry solids, would be pumped via Sludge Storage Tanks to a sludge dewatering plant, which would include plate presses to bring the dry solids content of the sludge cake to 25%.

464. It is estimated that, operating under normal demand conditions (154Mld), the treatment plant would produce 9,280m^3 of dewatered sludge cake over a six-month period. Two Sludge Storage Buildings would be provided to cater for this volume. Storage would be in a number of separate bays, at heights no greater than 3m, and allowing space for machinery to access and manoeuvre. These buildings would be covered, primarily to prevent contaminated rainwater runoff from the stored sludge being generated but also to maintain the sludge at the 25% dry solids content produced from the dewatering process. The sludge would be periodically removed for beneficial reuse in line with Uisce Éireann's preferred

management approach for WTP solid residuals, as described in EIAR Chapter 19 (Resource & Waste Management).

465. Supernatant from the picket fence thickener and water expressed (expressate) from the sludge dewatering process would be pumped, via the washwater treatment side stream, to the RWBT at the head of the treatment process.

466. There would be no discharge of process water from the WTP to nearby watercourses or any European site, in particular the Lower River Shannon SAC. The WTP has been designed as a 'closed' system, with any excess water being recirculated back to the intake via two Tank Draindown Management and Commissioning Lagoons, on-site, thereby avoiding impacts in relation to process water.

467. All tanks in the WTP would need to be drawn down, taken out of service and cleaned at least once per year. The plant has been designed to allow for the planned repair and maintenance and servicing of tanks, where tanks can be taken out of service without reducing the throughput of the plant. Discharge from the tank cleaning operations would also be drained to the Tank Draindown Management and Commissioning Lagoons, from where it would be pumped back to the RWBTs, via the process wastewater treatment system, for recirculation through the main treatment plant.

3.8.4 Treated Water Pipeline from the WTP to the BPT Operational Phase

468. During the Operational Phase of the Treated Water Pipeline, there would be no routine discharges from the Treated Water Pipeline to the surface water environment. Notwithstanding this, Washout Valves would be located along the pipeline. They would be used very rarely, as planned discharges are an infrequent occurrence and are typically required only for planned repair and maintenance (every 50 years). Planned repair and maintenance would only occur in low flow periods.

469. Locations of the Washout Valves and their associated infrastructure have been determined; Section 5.2.1.2 describes the circumstances and method of operation for these valves. For the purposes of this assessment, certain principles have been committed to, as follows:

- The water would be dechlorinated prior to discharge
- Washout Valves would be provided at low points along the pipeline, and would discharge through an outlet chamber to allow for the provision of dechlorination chemicals prior to discharge to a watercourse
- Washout chambers would be located in concrete chambers with locked manhole covers
- The flow of water from the valve chambers to the watercourse would be controlled in accordance with EPA and OPW requirements, subject to the applicable permitting regime at the time of release and planned to ensure receiving watercourses have capacity to accept the discharges (post-planning) and would follow a draindown strategy which matches flow to capacity of the receiving watercourse to prevent scour, erosion and increased sediment load in the receiving watercourses.

3.8.5 Break Pressure Tank Operational Phase

470. Water that arrives to the BPT site from the WTP would have an expected free chlorine residual concentration of 0.12mg/l. Chemical dosing would be undertaken to achieve a chlorine level of 0.73mg/l at the point of departure from the site in line with UÉ technical design standard TEC-900-05-02 (Disinfection: Secondary Chlorination). This would be achieved by dosing sodium hypochlorite at a dose rate of 1.48mg/l. The Control Building would be used for chemical storage as well as to house the chemical dosing plant. The dosing system would be capable of operating using either imported sodium hypochlorite or sodium hypochlorite produced on site by an on-site electro-chlorination system. To ensure that the levels of chlorine residual are accurately controlled, water quality sampling would be automatically undertaken on the inlet and the outlet to the BPT and would determine the level of dose

required at the BPT inlet pipework. To ensure thorough mixing, a static mixer is proposed immediately downstream of the dosing point.

471. The cleaning regime of any BPT depends primarily on the quality of the water entering it. If the water quality carries a large sediment load, then the BPT would need cleaning more often than if the load were small. Experience in the operation of the BPT would therefore dictate the frequency of BPT cleaning. Since this is a potable water pipeline there should be little or no sediment and therefore cleaning requirements would be minimal.

472. Cleaning of the BPT would take place in a carefully controlled and well-planned environment. To minimise risk of disruption to supply, the various dependent parties along the pipeline and those in Uisce Éireann's National Operations Management Centre would be advised well in advance to enable the preparation. This would normally involve ensuring reservoirs are topped up where possible.

473. The actual cleaning process would involve:

- Valving off of a single cell
- Emptying the cell of all water, initially to a residual 100mm above outlet pipe through normal usage with the final volume emptied through the scour drain to the attenuation/infiltration basin
- Manual cleaning of the cell
- Disinfection of the cell
- Refilling.

474. For this to happen, each cell of the reservoir has a scour drain (located in a sump) leading to an attenuation/infiltration basin.

3.8.6 Treated Water Pipeline from the BPT to the TPR Operational Phase

475. The Treated Water Pipeline from the BPT to the TPR would be operated using the same method as described for the Treated Water Pipeline from the WTP to the BPT; see Section 3.8.4.

3.8.7 Booster Pumping Station Operational Phase

476. During operation, above flows of 165Mld the BPS would push the water through the pipeline to deliver the required flow up to 300Mld. To achieve this, the pumps in the BPS would link to pressure and flow monitors on the pipeline, both upstream and downstream of the site. They would initiate when the pressure in the pipeline started to drop below a set-point. When the pumps activate, they would mechanically increase the water pressure in the pipe.

477. Use of the BPS would be restricted, in any given year, to periods of routine testing and maintenance of the BPS or when demand for water increases above 165Mld. In this latter scenario, the BPS would operate for as long as necessary to meet the increased water demand. At all other times, the BPS would be switched off and the Treated Water Pipeline from the BPT to the TPR would run in gravity mode on a bypass.

478. When required to run, two or three pumps would run in parallel to provide the required additional flow beyond the maximum gravity flow.

479. The pumps would be variable speed and provide coarse control of the flows in the Treated Water Pipeline from the BPT to the TPR. It is envisaged that fine control of flows to trim the level in the BPT would continue to be provided by the FCV.

480. When not in service, the BPS would require approximately weekly maintenance runs for each of the pumps to avoid damage to bearings and drive systems. This can be achieved without the need for a full transition to pumped mode since individual pumps can be spun without impacting on the normal gravity flows.

481. The site is intended for remote operation and would be provided with actuated valves and flow meters to facilitate the transition from gravity to pumped modes of operation. As a result, the site would not be permanently staffed, and operatives would only attend for route maintenance and inspection.

482. A SCADA system would communicate with and provide control from the WTP.

483. Start up and shut down sequences would be fully automated to avoid potential surge issues during the transition from gravity to pumped flow.

3.8.8 Flow Control Valve Operational Phase

484. The FCV would operate 24 hours a day to control water flows through the pipeline. This would be done remotely and using an automated system.

485. The site would not be permanently staffed and would be visited by operatives for routine inspection and maintenance.

3.8.9 Termination Point Reservoir Operational Phase

486. The purpose of the TPR is to provide the link between the Treated Water Pipeline and the existing local distribution network in the Greater Dublin Area Water Resource Zone. There is an existing drinking water reservoir with a capacity of 40Ml and control building operated by Uisce Éireann at this site.

487. The TPR would temporarily store treated water supplied through the pipeline so that it is ready to be used by consumers.

488. There would be three separate connections from the TPR for integration with the existing arrangements at the adjacent Peamount Reservoir:

- Connection 1: The TPR would supply the direct demand from the existing service reservoir
- Connection 2: Would connect to the Peamount Pumping Station for onward transfer to Saggart Reservoir and its supply area
- Connection 3: The TPR would connect to the pressure pipeline from Leixlip WTP and this would provide the option to reverse the flow to Leixlip for onward supply to North Dublin.

489. An Emergency Overflow Tank would be provided on the site as a buffer for scour or overflow from the TPR cells. All flows to the Emergency Overflow Tank would be removed via water tanker – there would be no discharge to the environment.

490. Water that arrives to the TPR site from the FCV would have an expected free chlorine residual concentration of 0.14mg/l. Chemical dosing would be undertaken to achieve a chlorine level of 0.68mg/l at the point of departure from the site in line with UÉ technical design standard TEC-900-05-02 (Disinfection: Secondary Chlorination). This would be achieved by dosing sodium hypochlorite at a dose rate of 1.43mg/l. The Chlorine Control Building would be used for chemical storage as well as to house the chemical dosing plant. The dosing system would use sodium hypochlorite produced on site by an on-site electro-chlorination system.

491. The cleaning process would involve valving off a single reservoir cell, emptying the cell of water, initially to a residual 300mm depth of water through normal usage by over pumping into other cells, with the final volume emptied through the scour drain to the emergency overflow storage tank, manual cleaning, disinfection and then refilling. During this operation, the other cells would continue to operate as normal.

3.9 Decommissioning Phase

492. The Proposed Project would deliver nationally important strategic infrastructure with individual elements designed with a lifespan of 80 to 100 years. The strategic importance of the Proposed Project for water supply in the Eastern and Midlands Region is such that there is no plan to decommission these structures and Uisce Éireann is committed to maintaining and repairing them into the future. On this basis it is not likely that the structures would be decommissioned and therefore, decommissioning of the Proposed Project has not been considered further in this assessment.

3.10 Background to the Proposed Project

493. The Proposed Project has been the subject of a systematic, authoritative and comprehensive consideration of alternatives from the identified need, through assessment of options to meet that need, and selection of a preferred option. This has included strategic options and alternatives within the preferred source option, including site selection, pipeline routing, and water treatment process options. The assessment took account of land use, planning and environmental effects at appropriate stages, as well as the views expressed in stakeholder and public consultation at each stage of the non-statutory consultation. EIAR Chapter 3 (Consideration of Reasonable Alternatives) provides further detail in relation to the consideration of reasonable alternatives.

3.10.1 National Water Resources Plan

494. Uisce Éireann has adopted the Republic of Ireland's first National Water Resources Plan (NWRP) for public water supply. The objective of the NWRP is to implement a strategic plan to meet Ireland's water requirements over the short, medium and long term by ensuring a safe, secure, sustainable and reliable water supply for all consumers. The NWRP consists of an overarching Framework Plan and four Regional Water Resource Plans (RWRP) which identify the preferred approach for each of the regions (North West, South West, South East and Eastern and Midlands). The RWRP – Eastern and Midlands Region (the 'Eastern and Midlands Plan'), was adopted in Autumn 2022 following public consultation.

495. The Framework Plan noted that planning for many projects was underway and projects were initiated prior to the development of the Framework Plan. These projects are called 'in-flight' projects and the Water Supply Project was one such in-flight project.

496. The key outcome from the Framework Plan and the Eastern and Midlands Plan, relevant for consideration of the in-flight Water Supply Project, was that a New Shannon Source with transfers was the preferred approach, comprising an abstraction from Parteen Basin and a transfer of treated water to a termination point reservoir in Dublin.

3.10.2 The Proposed Project's Alignment with the National Water Resources Plan

497. Both the Eastern and Midlands Plan and the project level options appraisal had determined that the preferred solution of the Greater Dublin Area and the wider Eastern and Midlands Region was a New Shannon Source with transfers.

498. Following the publication of the Eastern and Midlands Plan consideration was given to whether there was any project level information that required a review of the Regional Preferred Approach and none was identified, with exception of minor changes to update the Benefiting Corridor of the in-flight project to align with the Water Resource Zones identified in the Eastern and Midlands Plan (which became the Water Supply Area for the Proposed Project).

499. Having examined the outcomes of the Framework Plan and Eastern and Midlands Plan, it was concluded that the in-flight Water Supply Project consisting of a new water supply abstraction at Parteen Basin on the Lower River Shannon and a treated water pipeline to Dublin, with potential to supply a number of locations across the Midlands and East, is substantially consistent with the preferred approach identified in the Eastern and Midlands Plan consisting of the New Shannon Source with transfers.

3.10.3 Proposed Project Alternatives

500. The reasonable alternatives considered alternative locations, layouts, design, power provisions, construction, and mitigation measures for the Proposed Project.

501. Route appraisal and environmental surveys together with consultation feedback on a Least Constrained Pipeline Corridor resulted in a number of refinements to the optimal route, as it developed to become the Proposed Project. A full breakdown of the development of the final routing of the Proposed Project is set out in EIAR Appendix A3.1 (Pipeline Routing Report). Upon identification of the preferred source option and abstraction location at Parteen Basin, alternatives were also considered in site selection for the different infrastructure elements of the Proposed Project.

502. Uisce Éireann chose a route for the pipeline that avoids environmentally sensitive areas, as far as reasonably practicable and selected infrastructure site locations that, as far as reasonably practicable, minimise environmental impacts, whilst considering technical and cost factors.

4. Overview of the Receiving Environment

503. The ecological baseline, including European sites, within the ZoI of the Proposed Project is described in this section of the NIS. The geological, hydrogeological and hydrological baselines are also outlined herein. The geological, hydrogeological and hydrological baselines are related to the assessment of ecological impacts as they include potential pathways for impacts from the Proposed Project to affect European sites.

4.1 Hydrology and Water Catchments

504. There are 639 watercourse crossings throughout the Proposed Project in the Lower Shannon, Barrow, Boyne, and Liffey catchments, as listed in EIAR Appendix A8.14 (Watercourse Crossing Data). In total, 390 crossings are in the Lower Shannon catchment, 133 are in the Barrow catchment, 33 are in the Boyne catchment, and 83 are in the Liffey catchment. Of these 639 watercourse crossings, 546 are considered Heavily Modified Water Bodies (HMWBs) which correspond with the habitat type 'Drainage Ditch' (FW4). A total of 94 of all watercourses that would be crossed by the Proposed Project are WFD designated water body crossings (i.e. water bodies designated by the EPA as river water bodies under the WFD). Of the 639 watercourse crossings by the Proposed Project, 604 have a link to one or more European sites. The Proposed Project would have a hydrological pathway for effect to 14 European sites (i.e. Lower River Shannon SAC (002165), Lisduff Fen SAC (002147), Sharavogue Bog SAC (000859), River Barrow and River Nore SAC (002162), Lough Derg, North-east Shore SAC (002241), Rye Water Valley/Carton SAC (001398), Charleville Wood SAC (000571), River Boyne and River Blackwater SAC (002299), River Shannon Callows SAC (000216), Lough Derg (Shannon) SPA (004057), Dovegrove Callows SPA (004137), River Shannon and River Fergus Estuaries SPA (004077), River Boyne and River Blackwater SPA (004232) and Middle Shannon Callows SPA (004024)) (Table 6.2). In summary, 70 of the 604 watercourse crossings with a link to one or more European sites are 1km or less from the linked European site (namely the Lower River Shannon SAC and the Lisduff Fen SAC), 138 are between 1km and 5km, 167 are between 5km and 10km, and 229 are greater than 10km from the closest linked European site. Note, distances are directly from the boundary of the Proposed Project to the boundary of a European site (i.e. as the crow flies).

505. As part of the baseline water surveys, visual inspections and sampling were completed to gain an understanding of the hydrological environment in the study area of the Proposed Project and previous iterations of the project. A full description of the data collected can be found in EIAR Appendix A9.2 (Pipeline Assessment). This was used to inform the water quality assessment and the WFD Compliance Assessment (as reported in the Water Status Impact Assessment Report submitted with the Strategic Infrastructure Development application).

506. Fifty water bodies along the RWRMs and Treated Water Pipeline were visually inspected during field surveys in June 2021. Of these, 17 were visual inspections only, related to locations of proposed outfalls for permanent Washouts, while 33 locations were chosen for sampling as a result of being representative of a group of water body types, locations of proposed abstractions or locations of higher risks of impacts, e.g. some Construction Compound locations. The sampling locations were revisited in November 2021, November 2022, June 2023, November 2024, and June 2025 for sampling only, as further visual inspection was not considered necessary at all locations initially surveyed. The locations are detailed in A09.2 Figures 1 to 59 in Appendix A9.2 (Pipeline Assessment) of the EIAR. The findings of these inspections were used to:

- Determine the baseline of these water bodies (and their sensitivity to change)
- Support the analysis of potential impacts
- Determine suitability of water quality at abstraction locations for the testing and commissioning of the pipeline
- Determine suitability of physical features of a water body at permanent Washout Valve locations.

507. All of the samples taken were analysed for parameters which form part of the 'General Conditions' of water bodies European Union (EU) Environmental Objectives (Surface Waters) (Amendment) Regulations 2019, such as pH, dissolved oxygen, biological oxygen demand and nutrients. At 10 locations, an extended sampling suite was deployed and included chloride, chlorine, pesticides and in one location, heavy metals due to a potential source of contamination from historic mining operations. These locations are those which have been identified as potential abstraction points for water to be used in the testing and commissioning of the pipeline.

508. The majority of samples taken were within Environmental Water Quality Standards (outlined in the EU Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 and United Kingdom Technical Advisory Group (UKTAG) WFD Environmental Standards and Conditions Report, 2008). Therefore, only exceedances to Environmental Quality Standards (EQS) are illustrated in Table 4.1. Results of the full sampling suite are provided in EIAR Appendix A9.6 (Laboratory Analysis and In Situ Results).

Table 4.1: Surface Water Monitoring 'Exceedances' Results

WFD Designated Water Body Name	WFD Status	Water Body Crossing ID	Figure	Date	Result
Parameter: Biochemical Oxygen Demand (BOD) (mg/l) Standard: ≤ 1.5 (ECSR)					
KILMASTULLA_050	Moderate	WCX002	A09.2 Figure 6	November 2024	2
KILMASTULLA_050	Moderate	WCX003 and 004 Combined	A09.2 Figure 7	November 2024	2
KILMASTULLA_020	Moderate	WCX006	A09.2 Figure 9	November 2021	3
KILMASTULLA_020	Moderate	WCX009	A09.2 Figure 9	November 2021	4
KILMASTULLA_020	Moderate	WCX010	A09.2 Figure 9	November 2024	2
ARDGREGANE STREAM_010	Poor	WCX011	A09.2 Figure 10	November 2024	4
ARDGREGANE STREAM_010	Poor	WCX011	A09.2 Figure 10	June 2025	2
NENAGH_070	Moderate	WCX016	A09.2 Figure 12	November 2024	3
BALLYFINBOY_040	Moderate	WCX020	A09.2 Figure 17	June 2021	34.7
BALLYFINBOY_040	Moderate	WCX020	A09.2 Figure 17	November 2021	3
BALLYFINBOY_040	Moderate	WCX020	A09.2 Figure 17	June 2025	2
SHINRONE STREAM_010	Poor	WCX024	A09.2 Figure 20	November 2021	15
SHINRONE STREAM_010	Poor	WCX025	A09.2 Figure 20	November 2024	2
DAINGEAN_010	Poor	WCX046	A09.2 Figure 41	June 2021	6.07
DAINGEAN_010	Poor	WCX046	A09.2 Figure 41	November 2021	28
ESKER STREAM_020	Moderate	WCX054	A09.2 Figure 43	June 2023	4
FIGILE_030	Moderate	WCX056	A09.2 Figure 45	November 2021	3
FIGILE_030	Moderate	WCX056	A09.2 Figure 45	June 2023	2
FIGILE_020	Moderate	WCX058	A09.2 Figure 46	June 2021	2.2
FIGILE_010	Poor	WCX060	A09.2 Figure 49	November 2021	5
FIGILE_010	Poor	WCX060	A09.2 Figure 49	June 2025	9
BLACKWATER (LONGWOOD)_010	Poor	WCX062	A09.2 Figure 52	June 2021	2.03
BLACKWATER (LONGWOOD)_010	Poor	WCX062	A09.2 Figure 52	June 2023	2
BLACKWATER (LONGWOOD)_010	Poor	WCX062	A09.2 Figure 52	June 2025	2
CLONSHANBO_020	Poor	WCX069	A09.2 Figure 55	June 2021	6.41
CLONSHANBO_020	Poor	WCX069	A09.2 Figure 55	June 2023	2
LIFFEY_140	Good	WCX072	A09.2 Figure 57	November 2022	2

WFD Designated Water Body Name	WFD Status	Water Body Crossing ID	Figure	Date	Result
LIFFEY_140	Good	WCX072	A09.2 Figure 57	June 2025	2
LIFFEY_140	Good	WCX073	A09.2 Figure 57	November 2021	5
KILMASTULLA_050	Moderate	WCX077	A09.2 Figure 6	November 2021	4
KILMASTULLA_050	Moderate	WCX077	A09.2 Figure 6	November 2024	2
Parameter: Ammoniacal Nitrogen as N (mg/l) Standard: ≤ 0.065 (ECSR)					
KILMASTULLA_020	Moderate	WCX009	A09.2 Figure 9	November 2024	0.17
BALLYFINBOY_040	Moderate	WCX020	A09.2 Figure 17	November 2022	0.2
KILCOMIN STREAM_030	Moderate	WCX022	A09.2 Figure 19	November 2022	0.19
SHINRONE STREAM_010	Poor	WCX024	A09.2 Figure 20	November 2021	0.37
LITTLE BROSNA_030	Good	WCX026	A09.2 Figure 21	November 2021	0.09
CLODIAGH (TULLAMORE)_020	Good	WCX039	A09.2 Figure 36	June 2025	0.1
DAINGEAN_010	Poor	WCX046	A09.2 Figure 41	June 2021	4.68
DAINGEAN_010	Poor	WCX046	A09.2 Figure 41	November 2021	0.56
DAINGEAN_010	Poor	WCX046	A09.2 Figure 41	November 2022	0.15
DAINGEAN_030	Poor	WCX047	A09.2 Figure 42	November 2022	0.094
ESKER STREAM_010	Moderate	WCX049 Upstream	A09.2 Figure 42	November 2024	0.12
ESKER STREAM_020	Moderate	WCX054	A09.2 Figure 43	November 2022	0.12
ESKER STREAM_020	Moderate	WCX054	A09.2 Figure 43	November 2024	0.37
FIGILE_030	Moderate	WCX056	A09.2 Figure 45	November 2024	0.18
FIGILE_030	Moderate	WCX056	A09.2 Figure 45	June 2025	0.22
FIGILE_020	Moderate	WCX058	A09.2 Figure 46	November 2024	0.24
FIGILE_010	Poor	WCX060	A09.2 Figure 49	November 2024	0.48
FIGILE_010	Poor	WCX060	A09.2 Figure 49	June 2025	10
BLACKWATER (LONGWOOD)_010	Poor	WCX062	A09.2 Figure 52	June 2023	0.15
BLACKWATER (LONGWOOD)_010	Poor	WCX062	A09.2 Figure 52	November 2024	0.39
BLACKWATER (LONGWOOD)_010	Poor	WCX062	A09.2 Figure 52	June 2025	0.099
CLONSHANBO_010	Poor	WCX066	A09.2 Figure 54	November 2024	0.21
LYREEN_010	Poor	WCX070	A09.2 Figure 55	November 2021	0.09
Parameter: Total Suspended Solids (mg/l) Standard: ≤ 25 (ECQSW)					
KILMASTULLA_020	Moderate	WCX006	A09.2 Figure 9	June 2023	28
ARDGREGANE STREAM_010	Poor	WCX011	A09.2 Figure 10	November 2024	31
NENAGH_070	Moderate	WCX016	A09.2 Figure 12	November 2022	26
BALLYFINBOY_040	Moderate	WCX020	A09.2 Figure 17	June 2021	944
BALLYFINBOY_040	Moderate	WCX020	A09.2 Figure 17	June 2025	45
SHINRONE STREAM_010	Poor	WCX024	A09.2 Figure 20	November 2021	40
SHINRONE STREAM_010	Poor	WCX025	A09.2 Figure 20	November 2021	27
SILVER (KILCORMAC)_020	Good	WCX036	A09.2 Figure 32	November 2022	36
DAINGEAN_010	Poor	WCX046	A09.2 Figure 41	June 2021	47.4
DAINGEAN_010	Poor	WCX046	A09.2 Figure 41	November 2021	236
FIGILE_020	Moderate	WCX058	A09.2 Figure 46	November 2021	534
FIGILE_010	Poor	WCX060	A09.2 Figure 49	November 2021	75
FIGILE_010	Poor	WCX060	A09.2 Figure 49	November 2022	132

WFD Designated Water Body Name	WFD Status	Water Body Crossing ID	Figure	Date	Result
FIGILE_010	Poor	WCX060	A09.2 Figure 49	June 2025	206
CLONSHANBO_020	Poor	WCX069	A09.2 Figure 55	June 2023	57
KILMASTULLA_050	Moderate	WCX077	A09.2 Figure 6	November 2021	84
Parameter: Chlorine Total (Residual) (mg/l) Standard ≤ 0.005 (ECQSW)					
FIGILE_030	Moderate	WCX056	A09.2 Figure 45	June 2023	0.2
Parameter: COD, Unfiltered (mg/l) Standard: 125 (UWWT)					
DAINGEAN_010	Poor	WCX046	A09.2 Figure 41	November 2021	201
FIGILE_020	Moderate	WCX058	A09.2 Figure 46	November 2021	273
FIGILE_010	Poor	WCX060	A09.2 Figure 49	November 2022	144
Parameter: Cadmium (diss. filt) (µg/l) Standard: 0.08 (≤ 50 mg/l CaCO3) 0.09 (>50 and ≤ 100 mg/l CaC03) 0.15 (>100 and ≤ 200 mg/l CaC03) 0.25 (>=200 mg/l CaC03) (ECSR)					
KILMASTULLA_050	Moderate	WCX003 and 004 Combined	A09.2 Figure 7	November 2024	0.2
Parameter: Nickel (diss. filt) (µg/l) Standard: 4 (ECSR)					
SHINRONE STREAM_010	Poor	WCX024	A09.2 Figure 20	November 2021	16
LITTLE BROSNA_030	Good	WCX026	A09.2 Figure 21	November 2021	4.1
CLODIAGH (TULLAMORE)_020	Good	WCX039	A09.2 Figure 36	November 2022	4.1
FIGILE_030	Moderate	WCX056	A09.2 Figure 45	June 2023	15.3
FIGILE_020	Moderate	WCX058	A09.2 Figure 46	November 2024	4.4
FIGILE_010	Poor	WCX060	A09.2 Figure 49	November 2024	4.5
Parameter: Lead (diss. filt) (µg/l) Standard: 1.2 (ECSR)					
KILMASTULLA_050	Moderate	WCX003 and 004 Combined	A09.2 Figure 7	November 2024	6.3
Parameter: Zinc (diss. filt) (µg/l) Standard: 8 (≤10 mg/l CaCO3) 50 (>10 and ≤100 mg/l CaC03) 100 (>100 mg/l CaC03) (ECSR)					
KILMASTULLA_050	Moderate	WCX003 and 004 Combined	A09.2 Figure 7	November 2024	103.7

509. In summary, most of the water bodies sampled, and which would be crossed by the RWRMs and Treated Water Pipeline, were within EQSs at the time of sampling. The exceptions shown in Table 4.1 are largely moderate and poor WFD status water bodies.

510. A number of the water bodies showed elevated levels of more than one of the parameters being assessed, namely the Kilmastulla_050, Kilmastulla_020, Ardgregane Stream_010, Nenagh_070, Ballyfinboy_040, Shinrone Stream_010, Daingean_010, Esker Stream_020, Figile_030, Figile_020, Figile_010, Blackwater (Longwood)_010, Clonshanbo_020 and Little Brosna_030. The remaining water bodies have minor exceedances of the standards and are not considered significant as these are one-off samples at a single point in time. It is difficult to assume long-term trends in these cases.

511. At the potential abstraction points for water to be used in the testing and commissioning of the pipeline, a wider suite of parameters was analysed to inform the potential likely treatment requirements for the abstracted water. In summary, the majority of water bodies registered sample results within the EQSs, with a few exceptions including the following:

- The Kilmastulla_040, the Nenagh_070, Clodiagh (Tullamore)_020 and Liffey_040 were largely within standard limits for all parameters with the exception of exceedances for Ammoniacal Nitrogen, BOD (Unfiltered), Chlorine and Phosphate (Ortho as P)
- Similarly, the Little Brosna_030 was largely within standard limits for all parameters with the exception of exceedances for Ammoniacal Nitrogen, BOD (Unfiltered), Chlorine, Phosphate (Ortho as P) but also Total Suspended Solids
- Figile_030 was largely within standard limits for all parameters with the exception of exceedances for Ammoniacal Nitrogen, BOD (Unfiltered), Chlorine, Phosphate (Ortho as P), Total Suspended Solids and Chemical Oxygen Demand.

4.1.1 Current Operation and Management of Lough Derg, Parteen Basin, and the Old River Shannon

4.1.1.1 Lough Derg and Parteen Basin

512. At present, the normal water level on Lough Derg and on Parteen Basin is managed to be between the following limits:

- Parteen Basin: Upper level 30.86mOD Malin Head (33.56mAOD Poolbeg). Lower level: 30.00mAOD Malin Head (32.70mAOD Poolbeg)
- Lough Derg: Upper level 30.86mAOD Malin Head (33.56mOD Poolbeg). Lower level: 30.40mAOD Malin Head (33.10mAOD Poolbeg).

513. Parteen Weir acts as the downstream control structure for water levels in the system. Water levels in Parteen Basin are maintained within the upper and lower levels at all times. During low flow conditions, the lower water level at Parteen Basin (30.0mAOD Malin), must be maintained for dam safety purposes and in doing this ESB ensures that water levels in Lough Derg are within the Normal Operating Band as the waterbodies broadly operate as a combined system, in these conditions.

514. ESB also continually discharges a statutory flow of 10m^3/s down the Old River Shannon. By selecting how many turbines are in operation each day, ESB can set how much water is diverted from Parteen Basin to the station daily. To generate its full electrical output, each hydro turbine at Ardnacrusha takes approximately 100m^3/s (100 cubic metres per second or tonnes of water per second). With its four turbines at full output, Ardnacrusha can take a flow of up to 400m^3/s.

515. The overall runoff from the catchment, and the volumes of water passing through the Head Race and Old River Shannon, depend on ‘wet’ and ‘dry’ years, and on the profiles of floods and dry weather across any given year. Over the 52 years (1972-2023) analysed in the hydrological model, between 67% and 92% of flow at Parteen Basin passed through Ardnacrusha Generating Station. The lower percentage years reflect dry years overall, or a wet year with substantive flood peaks. The year which experienced this minimum 67% rate occurred during the 2018 drought, the worst event within the 52-year record, when flows to Ardnacrusha Generating Station were curtailed for most of the year. In broad scale terms, approximately 90%-95% of the long-term average annual flow in the River Shannon at Parteen Basin (approximately 180m^3/s), is directed through Ardnacrusha, with a minimum statutory compensation water flow of 10m^3/s directed to the Old River Shannon at Parteen Weir (see Section 4.1.1.2 for further information on flows down the Old River Shannon).

516. The Ardnacrusha Generating Station can take a maximum flow of 400m^3/s to the four generators located at the power station. When inflow of water to Lough Derg is high and water level exceeds 30.86mAOD

(Malin Head), which is the upper end of the Normal Operating Band, flow to the Old River Shannon is increased. This operation ensures safe passage of flood water and returns water levels to within the Normal Operating Band. Historically, in late autumn, ESB tends to maintain water levels at the lower end of the Normal Operating Band in anticipation of the need to operate in higher flow conditions in autumn/winter. ESB monitors the falling hydrograph in spring before intervening to retain water levels at the upper end of the operating band. Subject to prevailing conditions, water levels are maintained at this upper level with consideration given to the Old River Shannon statutory compensation flow.

517. During summertime flood conditions, the need to maintain water levels towards the upper end of the Normal Operating Band is temporarily suspended, flow of water is increased and Lough Derg is thereby managed by ESB for the safe passage of flood water. A resumption of the 'low flow regime' takes place once flood water has passed and the falling hydrograph is established and monitored, as before.

518. Table 4.2 shows the Normal Operating Band on Lough Derg and upper and lower levels that ESB apply to Parteen Basin.

Table 4.2: Normal Water Levels on Lough Derg and Parteen Basin (metres Above Ordnance Datum)

Level	Lough Derg	Parteen Basin
	mAOD Malin Head	mAOD Malin Head
Upper level	30.86	30.86
Lower level	30.40	30.00

4.1.1.2 Old River Shannon

519. The ESB keeps daily records of the flow through Ardnacrusha and the total amount of water leaving Parteen Basin, as far back as 1932. Total flow in cubic metres per second (m^3/sec) is monitored by the ESB at Parteen Weir and Ardnacrusha Generating Station. These levels were provided by the ESB for use in this assessment. Graph 4.1 shows a six-year sample of this record. As stated above, the Old River Shannon receives a statutory compensation flow of 10m^3/s. The flow over Parteen Weir typically remains at this value until the Ardnacrusha Generating Station reaches capacity at or near 400m^3/s. This behaviour can be observed in Graph 4.1 and Graph 4.2. In Graph 4.2 the total flow into Parteen Basin is compared to the flow over Parteen Weir. When the total flow is less than 400m^3/s, little to no additional flow above the statutory compensation flow is passed over Parteen Weir (with the exception of some outliers). Once the total flow entering Parteen Basin exceeds 400m^3/s, any further increases in flow are passed over Parteen Weir. An almost one-to-one relationship can be observed between the increase in total flow into Parteen Basin and flow over Parteen Weir once the capacity of Ardnacrusha Generating Station has been exceeded. As can also be seen in Graph 4.1, there are long periods where only statutory compensation flow is provided without variation (see 2005 to 2007). When flows are altered into the Old River Shannon, the rate of change in flow tends to be steep.

520. A hydrological model developed for the Proposed Project was used to assess the impact of the proposed abstraction on the water levels of Lough Derg and Parteen Basin and the forward flows released to the Old River Shannon. Two constant rates of abstraction have been investigated: i) 154Mld – taken to be representative of normal operation demand by the year 2050, and ii) 300Mld – projected peak need/demand at year 2050. The model was run using data from the period 1 January 1972 to 31 October 2023, allowing the simulation of daily levels and daily flows across this 52-year period with and without the proposed abstraction in place. Runs of the model on earlier periods of time prior to 1972 have not been undertaken as the more recent data is the most representative of the River Shannon current water resources management practices. The model was further developed to incorporated future climate change scenarios[12] to also allow a simulation of the impact with the Proposed Project in place and

[12] A precautionary approach to the consideration of climate change and a 'reasonable worst case' for the 2080s epoch has been used.

including the effects of future climate change on flows on the River Shannon. As a separate exercise, in order to test whether objectives to restore the favourable conservation status of the qualifying interests of the Lower River Shannon SAC (in the context of the hydrological regime) would be impeded by the Proposed Project, a sensitivity analysis was undertaken to apply an outline Eflows approach proposed in a recent study (CDM Smith 2021)[13] to the model and investigate the potential impacts of future changes in the compensation flow regime.

521. The impacts to Lake levels and forward flows to the Old River Shannon due to the modelled inclusion of the Proposed Project abstraction (as a constant flow of either 154Mld or 300Mld) were found to be barely distinguishable from the baseline case when viewed on level\flow duration curves (a standard hydrological method for comparing long-term data series).

522. The hydrological model demonstrates the level regimes of both Lough Derg and Parteen Basin are only simulated to be affected by the introduction of the Proposed Project abstraction during extreme drought periods and in the days immediately after the drought (up to a week) when inflow is needed to replenish any deficit in storage caused by the Proposed Project abstraction. This is because during drought conditions, ESB cease Ardnacrusha power generation so there are no means to adjust Ardnacrusha flows to provide the Proposed Project abstraction flows, and it must be provided from the Lake storage. From the 52-year model simulation period (1972 to 2023), the simulated Lake levels are only found to be notably affected by the inclusion of WSP during the 1995 and 2018 drought events, with all other years showing no perceptible impacts. Therefore, for approximately 99% of the 52-year model simulation period, there are no perceptible impacts to simulated Lake levels as a result of the proposed WSP abstraction. The compensation and fish pass flows are always met, with or without the abstraction in place within the modelling undertaken.

523. During flood flows, when the ESB can no longer keep the water level below the top of the Normal Operating Band, the ESB can operate Ardnacrusha at full capacity as they have done in the past, and the Proposed Project abstraction flow would be provided from a minor depletion in the simulated Lake storage. The forward flows to the Old River Shannon remain unchanged by the inclusion of the Proposed Project abstraction. The proportion of days (to the nearest whole percent) when the Old River Shannon is receiving just the compensation and fish pass flows remains the same as does the timing of the spills when Ardnacrusha is at full capacity.

524. As previously noted, ESB will facilitate the proposed abstraction of water by the Proposed Project within its current operating practices. As part of an overall agreement with ESB, water will be diverted to the Proposed Project abstraction from the flow that would otherwise have been used for electricity generation on a continuous year-round basis. At a practical level, this will mean that ESB, in keeping the water level within the Normal Operating Band on Lough Derg and within the upper and lower water level on Parteen Basin, will take account of, and respond to, the volume of water abstracted for the Proposed Project, alongside other relevant considerations such as, maintaining statutory compensation flow of $10m^3/s$ down the old Shannon channel, predicted rainfall, the demand for power and operating practices. ESB will maintain the water levels within the Normal Operating Band on Lough Derg and within the upper and lower water levels on Parteen Basin, as it does currently. Over longer periods there would be a generalised adjustment of the flow going to Ardnacrusha by ESB to respond to the volume of water used by the Proposed Project. However, the operation of Lough Derg, post works, will feel and look very similar to the way it currently operates, and there will not be a visible day to day difference.

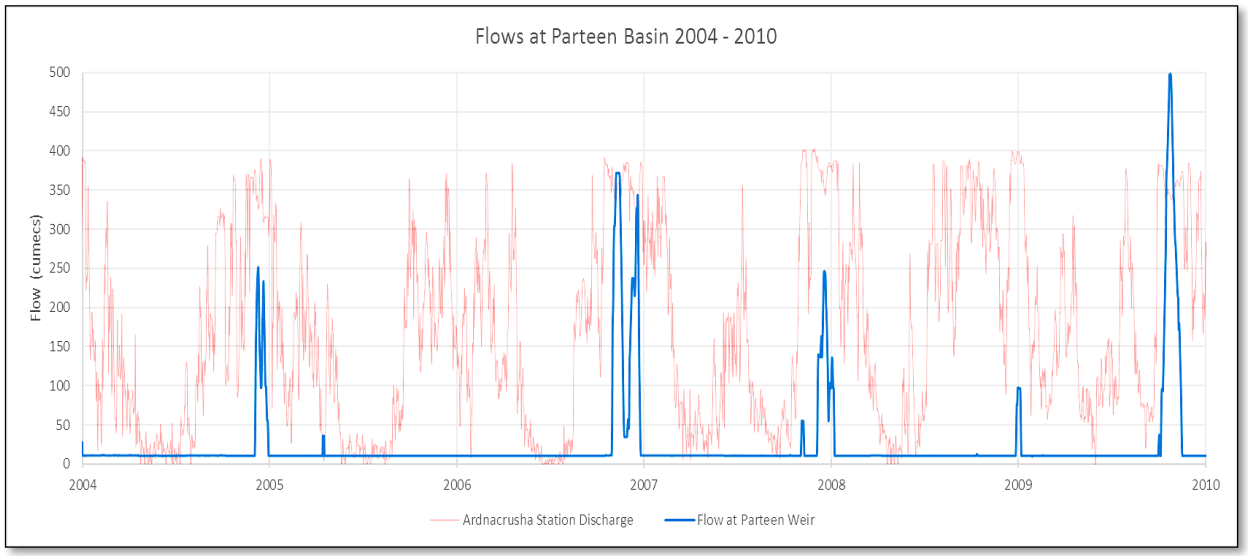
525. As noted, a sensitivity analysis to the proposed EFlow regime at Parteen Weir (CDM Smith 2021), in which the existing $10m^3/s$ compensation and fish pass flow is replaced by a varying compensation flow with the inclusion of freshets (increased flows during a flood event or a release of additional water) to

[13] CDM Smith (2021). Roadmap for the Lower River Shannon Report 2021. Provision of Expert Advisory Services Regarding Fish Migration in the Lower River Shannon Catchment. Prepared by CDM Smith for the Department of Housing, Local Government and Heritage (CDM Smith (2021). Fish Pass Feasibility Study)

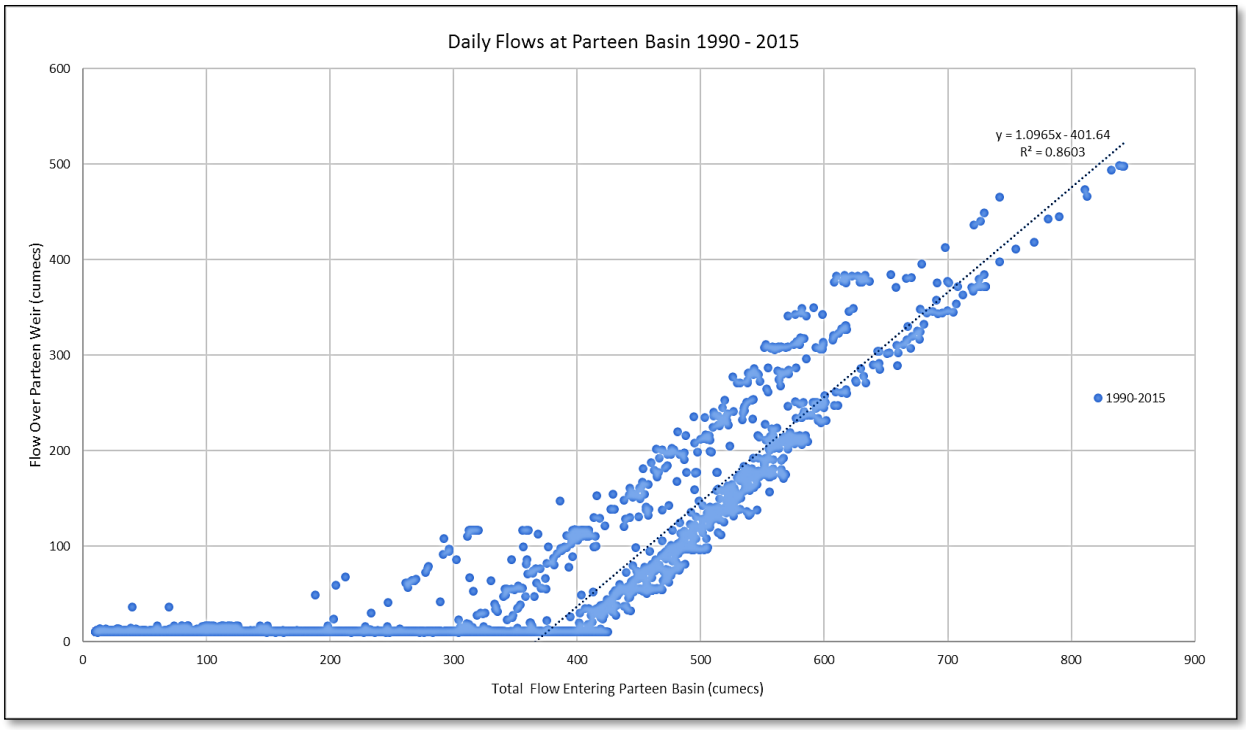
assist migratory fish up the Old River Shannon and into Parteen Basin, was undertaken. This found that similar water level differences were simulated during the droughts when the proposed abstractions were included in the EFlow scenario as were predicted for the case for a constant compensation flow. However, this relies on the assumption that freshets would not be released during flood (i.e. when spilling) or drought conditions. The basis of this drought period assumption is that if the Eflow is an attempt to mimic the natural flow regime then artificially releasing standard freshets over this period would seem to be introducing a non-natural characteristic to the flow regime.

526. In summary, the hydrological model found that the released flows to the Old River Shannon during periods of spill are virtually the same for the Proposed Project abstraction rate of 300Mld with either a compensation flow of 10m^3/s or Eflows. However, outside of flood and drought periods more water is released, together with flow variability, by the Eflows regime compared to the use of a uniform 10m^3/s compensation flow. Full details of the hydrological model Eflows sensitivity analysis are provided in the EIAR Appendix A9.1 Annex A (Hydrological Modelling Report).

527. Reinstatement of more natural water regimes would involve partly storing all flood inflows and partly spilling to the Lower River Shannon in a naturally variable freshet time profile. Having due regard to the River Shannon statutory compensation flow obligations, ESB's current practice is that late spring water level is kept near the top of the Normal Operating Band. At winter flood times, and when autumn recovery has started, greater sharing of inflows between storage and the Old River Shannon reduces water available for use in hydropower, reducing revenue to ESB. The Proposed Project would be abstracting up to a maximum of 300Mld or 3.47m^3/s and while there may be technicalities for ESB in adjusting gates to provide flow variability, the Proposed Project would not impede a flow-sharing decision between hydropower and statutory compensation flow at appropriate times of the year and is not an impediment to any Parteen Weir gate adjustments to implement it.



Graph 4.1: Flows at Parteen Basin from 2004 to 2010



Graph 4.2: Daily Flows at Parteen Basin from 1990 to 2015

4.1.1.3 Headrace and Tailrace

528. The Headrace[14] feeds approximately 90-95% of the average long-term flow from the River Shannon to the Ardnacrusha Generating Station. Once the flow passes through the power station, it is known as the 'Tailrace'[15] before its confluence with the Old River Shannon; this confluence is tidally influenced.

529. The flow rates passing through the Ardnacrusha Generating Station are normally defined by the capacity of four generators. Each of the generators has an approximate capacity of 100m^3/s. The flow rate varies due to the gross head but is typically 100m^3/s per generator. Taking all of this into consideration, there are five typical flow rate scenarios the Tailrace experiences:

- No generator in operation (passing 0.7m^3/s through the existing fish pass)
- One generator (passing 100m^3/s)
- Two generators (passing 200m^3/s)
- Three generators (passing 300m^3/s)
- Four generators (passing 400m^3/s).

530. The flow through the power station varies on an hourly basis, typically peaking during corresponding peak hours of electricity usage. During summer months there is insufficient flow for 24-hour operation and therefore it is common practice for the plant not to operate for long periods (greater than 12 hours) as this maximises the available volume for generation at peak hours. From a review of hourly data from June 2015 until end of December 2016, only the flow through the fish pass (0.7m^3/s) entered the Tailrace for 34% of that time.

[14] A channel which feeds water to the Ardnacrusha Generating Station from Parteen Basin.

[15] The channel downstream of Ardnacrusha Generating Station, prior to the confluence with the Old River Shannon.

4.2 Soils and Subsoils

531. Information concerning soil types is contained in the General Soil Map of Ireland (An Foras Talúntais 1980); Soils of County Clare (An Foras Talúntais 1971); Soils of County Limerick (An Foras Talúntais 1966); Soils of Tipperary, North Riding (An Foras Talúntais 1993); Soils of County Offaly (Teagasc 2003); Soils of County Kildare (An Foras Talúntais 1970); and on the GSI website (GSI n.d.). Information regarding the soil classifications was obtained from the GSI web-mapping site, which includes soil information from the Teagasc/EPA soil and subsoil mapping project (Teagasc 2006).

532. Acidic (non-calcareous) soils are mainly located in the west of the Proposed Project. Acidic soils occur at the RWI&PS, RWRMs, WTP, from Chainage TW – 0 to TW – 16400 near Nenagh and an area of the 38 kV Uprate Works. Basic soils dominate from TW – 16400 to the TPR. Soils are shown on EIAR Figure 10.1 to Figure 10.4.

533. Information concerning the Quaternary (Subsoil) Geology is contained on the GSI website (GSI n.d.). Most of the Quaternary (subsoils) sediments were deposited during the Ice Age itself, either directly from the ice sheets that moved from north-west to south-east or from the meltwater following the slowly melting ice sheets. Subsoils are shown on EIAR Figure 10.5 to Figure 10.8.

534. The following sections describe the soils and subsoils along the Proposed Project.

4.2.1 Raw Water Intake and Pumping Station

535. A range of soil types are present near the RWI&PS site at Parteen Basin (EIAR Chapter 10: Soils, Geology and Hydrogeology). The principal mapped soil group at the RWI&PS is BminSW – Shallow well mineral soil, derived from mainly calcareous parent materials. Based on the site walkovers and GI information, soils on the RWI&PS comprise surface water/groundwater gleys. Gley soils are typically saturated for varying periods of the year and typically heavy textured.

536. The underlying subsoils at the RWI&PS comprise till derived from various rock formations (EPA n.d.), classed as grey gravelly, silty, fine to medium SAND to an average depth of 4m bgl. The sandy horizon overlies firm to stiff pinkish orangish brown slightly sandy gravelly SILT/CLAY with occasional subangular sandstone boulders and cobbles. Based on the borehole data, the depth of subsoil varies from 8.4m bgl at RWI-BH015 to 15.2m bgl at RC-138 (see EIAR Appendix A10.1 (2018 Ground Investigations), EIAR Appendix A10.4 to EIAR Appendix A10.14 (2022 and 2023 Ground Investigations), and EIAR Figure 10.28). No peat was encountered on the RWI&PS site.

537. To the south of the RWI&PS site, a large area of alluvial soils is mapped along the shoreline of Parteen Basin, largely associated with the Kilmastulla River. In the postglacial period, extensive alluvial deposits accumulated in the flat river valleys and across floodplains. The soils can display a wide range of physical characteristics both within and between profiles depending on the mode of deposition. In general, these alluvial deposits can be of variable thickness overlying the glacial drift. The Kilmastulla River channel was deepened and straightened as part of the Kilmastulla Drainage District in the 1920s and is lined and monitored by ESB. Further drainage of the lands occurred as part of the forestry plantation to the south of the site.

4.2.2 Twin RWRMs

538. A range of soil types are present near the WTP site and along the twin RWRMs (EIAR Chapter 10: Soils, Geology and Hydrogeology). The principal soil group along the twin RWRMs is AminPD – Deep poorly-drained mineral soil, derived from mainly non-calcareous parent materials. Surface water gleys and groundwater gleys may be included in this category.

539. Based on the GI data, the soils along the RWRM comprise poorly-drained, grey to light brown CLAY, consistent with the classification as surface water/groundwater gleys. Alluvial soils are mapped along a drainage ditch (WBX001) at Chainage RW – 200. Peaty soils were encountered along a drainage ditch (WBX003) at Chainage RW – 1000 (see EIAR Appendix A10.1: 2018 Ground Investigations and EIAR Appendix A10.2: 2022 and 2023 Ground Investigations).

540. With reference to GSI mapping, the subsoils primarily comprise Till derived from Lower Palaeozoic and Devonian sandstones (TLPDSs). Till derived from Lower Palaeozoic shales/sandstone (TLPSsS) are also present on the north and north-western boundary of the site (refer to EIAR Figure 10.5). Subsoils along the RWRM are variable but are predominantly comprised of firm brown slightly sandy slightly gravelly CLAY with low cobble content.

4.2.3 Water Treatment Plant

541. The principal soil group at the WTP is AminPD – Deep poorly-drained mineral soil, derived from mainly non-calcareous parent materials. Surface water gleys and groundwater gleys may be included in this category. Soils at the WTP site comprise poorly-drained, grey to light brown CLAY, consistent with the classification as surface water/groundwater gleys. Based on the site walkover and site investigation data, the soils on site are surface water gleys.

542. A total of 170 boreholes and 95 trial pits were completed at the WTP site (EIAR Appendix A10.6). The underlying subsoils at the WTP site comprise till derived from various rock formations. Glacial till is composed of a heterogeneous mixture of clay, sand, gravel and boulders. With reference to GSI mapping (GSI n.d.), the subsoils primarily comprise till derived from Lower Palaeozoic and Devonian sandstones (TLPDSs). Till derived from Lower Palaeozoic shales/sandstone (TLPSsS) are also present on the north and north-western boundary of the site (EIAR Figure 10.5).

543. Natural deposits were predominantly described as, Till; soft to stiff, (slightly) sandy (slightly) gravelly CLAY/ SILT, with varying Cobble content, extending from depths of 9.6m bgl to 28.0m bgl (EIAR Appendix A10.6). Occasional deposits of clayey gravelly SAND and clayey sandy GRAVEL were also identified. The subsoils depths vary between 9.6m bgl (WTP-BH070) to 35.10m bgl (WTP-BH013). The subsoils at the WTP have a high clay content >15% and moderate/low permeability. No bedrock exposure was encountered. To the south of the WTP site, an area of alluvial soils is present along the Kilmastulla River. Localised peaty soils (<0.5m) and peat horizons were encountered along the WTP access road. The peat is not active, highly modified/drained and is used as pastureland. Peat was noted in the following trial pits:

- WTP-TP087 (0.4-1m bgl) – Dark brown, clayey fibrous PEAT
- WTP-TP091 (0.6-1.3m bgl) - dark brown, slightly clayey fibrous PEAT
- WTP-TP119 (0.3-1.2m bgl) slightly clayey fibrous PEAT.

4.2.4 Break Pressure Tank

544. At the BPT, the mapped soils are BminDW – Deep well-drained mineral soil, derived from mainly calcareous parent materials and BminSW – Shallow well-drained mineral soil, derived from mainly calcareous parent materials. Lithosols and regosols are included in this category.

545. With reference to GSI mapping (GSI n.d.), the subsoils primarily comprise till derived from carboniferous limestone (TLs). Borehole data to the west of the BPT confirms the presence of deep, well-drained soils (>10m at RC196). Shallow bedrock was recorded to the east of the BPT site.

546. Based on topography and the geomorphology of the area, the depth of soils becomes shallower on the backslopes and shoulders of the hill, i.e., to the centre and east of the site. The BPT site is on a crag and tail where rock depth varies over short distances. Rock near the surface is mapped to the south and east of the BPT site, with evidence of outcrop on the northern and southern boundaries. No peat deposits were encountered on the BPT site. Borehole data from 2022 confirms subsoils to the west of the BPT predominantly comprise firm to stiff orangish reddish brown (slightly) sandy (slightly) gravelly SILT, with varying cobble content of limestone extending from depths of 1.7m bgl (BPT-BH001) to 26.1m bgl (BPT-BH008). Occasional deposits of very dense angular to subangular fine to course dark grey limestone GRAVEL and (slightly) silty SAND were encountered extending to a depth of 30.5m in BPT-BH027, with occasional deposits of sandy gravelly CLAY encountered throughout the west of the site. Soils to the east of the BPT also comprised glacial till, with firm dark reddish brown sandy SILT extending to 0.4m bgl in BPT-BH010, and greyish brown silty sandy fine to coarse grey limestone GRAVEL extending to a depth of 2.9m bgl (BPT-BH032). Occasional deposits of (slightly) gravelly CLAY were also encountered to the east of the site. Based on the borehole data, the subsoil depths vary between 0.40m bgl in BPT-BH010 and 30.5m bgl in BPT-BH027. Subsoil thickness decreases to the northwest. Subsoil thickness decreases from west to east across the site with deeper soils to the west of the site and shallow soils to the centre and east of the site. A number of deeper infilled channels occur on the BPT. Approximately 250m to the east of the BPT, shallow, well-drained soils occur (2.1m at RC197).

4.2.5 Booster Pumping Station

547. Deep soils predominate at the BPS site (EIAR Chapter 10: Soils, Geology and Hydrogeology). The main soils include Grey Brown Podzolics and Brown Earths. The mapped soils are BminDW – Deep well-drained mineral soil, derived from mainly calcareous parent materials and BminPD – Deep poorly drained mineral soil, derived from mainly calcareous parent materials.

548. With reference to GSI mapping (GSI n.d.), the subsoils primarily comprise TLs. Borehole data to the west of the BPS (BH098) confirms the presence of glacial till material (EIAR Appendix A10.1 and Appendix A10.10). Based on borehole data for the area, the till primarily comprises cohesive soils, namely soft greyish brown sandy CLAY. Small historical gravel pits are located 200m to the south and east of the BPS site. There is no evidence of rock outcrop on the site or the adjacent stream.

549. Borehole data reveal subsoils on the BPS are predominantly made up of a layer of (slightly) gravelly (slightly) silty greyish brown CLAY with occasional cobbles, overlying a layer of brown, dense becoming very dense (very) silty and (very) sandy GRAVEL with occasional cobbles and boulders (see EIAR Appendix A10.10). Occasional horizons of 1m to 5m silty gravelly SAND and occasional deposits of gravelly sandy SILT were also identified. Bedrock was not encountered in any of the boreholes to a depth of 20.4m bgl (BPS-BH008) and no peat deposits were encountered on the BPS site.

4.2.6 Flow Control Valve

550. Shallow soils predominate at the FCV site. The main soils include Grey Brown Podzolics and Brown Earths. The mapped soils are BminPD – Deep poorly-drained mineral soil, derived from mainly calcareous parent materials.

551. With reference to GSI mapping, the subsoils primarily comprise TLs (refer to EIAR Figure 10.8). Borehole data to the west of the FCV (BH213) confirms the presence of glacial till material (EIAR Appendix A10.1 and Appendix A10.10). Based on borehole data for the area, the till primarily comprises cohesive soils, namely soft greyish brown sandy CLAY. Borehole data reveal subsoils on the FCV are predominantly made up of a layer of (slightly) gravelly (slightly) silty greyish brown gravelly CLAY with occasional cobbles and boulders. Based on the borehole data, the subsoil depth is 2.5m bgl (BH213). No peat deposits were encountered on the FCV site.

4.2.7 Termination Point Reservoir

552. The TPR site is mapped as shallow, well-drained, mineral soil, derived mainly from calcareous parent materials and mapped as Shallow well drained mineral – Mainly basic (BminSW).

553. Ground investigation data confirmed the presence of shallow well-drained subsoils at the site (>2m in RC185 and RC186). Based on borehole data for the area, the till primarily comprises cohesive soils namely grey/brown, firm to stiff, slightly sandy CLAY (EIAR Appendix A10.1 and Appendix A10.13).

554. Site investigation locations for the TPR are shown on EIAR Figure 10.81. Borehole data confirmed that soils on the TPR site comprise a layer of firm becoming stiff to very stiff, brown sandy gravelly CLAY with occasional cobbles extending to depths ranging from 0.4m bgl (TPR-DS-001) to 2.15m bgl (TPR-BH-002), frequently overlying a layer of brown clayey/silty slightly sandy GRAVEL extending to depths of up to 3.0m bgl (TPR-DS-015). Made Ground deposits were also encountered to the east of the TPR site comprising brown gravelly sandy clay overlying a layer of clayey silty angular gravel encountered in TPR-BH-009 and TPR-BH-012. A layer of orangish brown clayey/silty sandy GRAVEL extending to a depth of 1.05m was encountered, overlying a layer of stiff greyish brown slightly sandy slightly gravelly CLAY, with occasional cobbles of limestone extending to a depth of 1.7m in TPR-DS-010. No peat deposits were encountered at the TPR site.

4.2.8 Construction Compounds and Pipe Storage Depots

555. Eight Construction Compounds are required to facilitate construction of the Proposed Project including four Principal Construction Compounds and four Satellite Construction Compounds. A summary of the soils and subsoils at each location is detailed in Table 4.3 (EIAR Chapter 10: Soils, Geology and Hydrogeology).

Table 4.3: Soils and Subsoils at Construction Compounds (CC)

Construction Compound (CC)	Soils	Subsoils
CC0 Satellite – Garrynatineel, County Tipperary	AminDW - Acidic deep well drained mineral soils	Predominantly till derived from sandstone and shales
CC1 Principal – Incha Beg, County Tipperary	AminPD - Acidic deep poorly drained mineral soils	Predominantly till derived from sandstones and shales
CC2 Principal – Lisgarriff, County Tipperary	BminDW - Predominantly basic deep well drained mineral soils	Predominantly till derived from limestone, some sand and gravels (esker gravels)
CC3 Satellite – Knockanacree, County Tipperary at BPT	BminSW and BminDW - Shallow to deep well drained soils	Predominantly till derived from limestone
CC4 Satellite – Coagh Upper, County Offaly at BPS	BminDW - Basic deep well drained and poorly drained mineral soils	Predominantly till derived from limestone
CC5 Principal – Kilananny, County Offaly	BminDW - Basic deep well drained mineral soils and cutover peat	Predominantly till derived from limestone and cutover peat
CC6 Principal – Drummond, County Kildare	BminPD - Basic deep poorly drained mineral	Predominantly till derived from limestone
CC7 Satellite – Peamount, County Dublin at TPR	BminDW and BminPD - Basic deep well drained and poorly drained mineral soils	Predominantly till derived from limestone

556. Pipe Storage Depots would serve the installation of pipeline between the WTP and the TPR. A summary of the soils and subsoils based on the Teagasc/EPA and GSI Quaternary data, are detailed in Table 4.4.

Table 4.4: Soils and Subsoils at Pipe Storage Depots (PSDs)

Pipe Storage Depot (PSD)	Soils	Subsoils
PSD1 – Carrigatogher, County Tipperary	BminDW – Deep well drained mineral (Mainly Basic)	Predominantly till derived from limestone
PSD2 – Toora, County Tipperary	BminDW – Deep well drained mineral (Mainly Basic)	Predominantly till derived from limestone
PSD3 – Boveen, County Offaly	BminDW – Deep well drained mineral (Mainly Basic)	Predominantly till derived from limestone
PSD4 – Fortel, County Offaly	BMinDW – Deep well drained mineral (Mainly Basic) Cut - Cutover/cutaway peat (in some areas)	Cutover peat overlying till derived from limestone
PSD5 – Derrinboy, County Offaly	BminDW – Deep well drained mineral (Mainly Basic)	Cutover peat overlying till derived from limestone
PSD6 – Derryweelan, County Offaly	BminDW – Deep well drained mineral (Mainly Basic) BminPDPT – Peaty poorly drained mineral (Mainly basic)	Predominantly till derived from limestone
PSD8 – Rathlumber, County Offaly	BMinSW – Shallow well drained mineral (Mainly basic)	Cutover peat overlying till derived from limestone.
PSD9 – Baltracey/Graigpottle, County Offaly	BminDW – Deep well drained mineral (Mainly Basic))	Predominantly till derived from limestone
PSD10 – Barberstown Lower, County Kildare	BminPD – Mineral poorly drained (Mainly basic)	Predominantly till derived from limestone

Note: there is no PSD7, and therefore, this hasn't been omitted from this table.

4.2.9 Treated Water Pipeline

557. A large range of soils are present along the Treated Water Pipeline (EIAR Chapter 10: Soils, Geology and Hydrogeology). The most predominant soil groups include:

- AminPD – Deep poorly-drained mineral soil, derived from mainly non-calcareous parent materials. Surface water gleys and groundwater gleys are included in this category
- AminDW – Deep well-drained mineral soil, derived from mainly non-calcareous parent materials. Acid brown earths and Brown podzolics are included in this category.

558. Acidic soils are located along the western sections of the Treated Water Pipeline from the WTP to the BPT between Chainage TW – 0 to TW – 16400. Basic soils dominate from TW – 16400 to the TPR. Cutover peat is the main soil type in east Offaly TWC – 12000 and west Kildare TWD – 27700.

559. General information concerning the Quaternary (Subsoil) Geology is contained on the GSI website (GSI n.d.). Most of the Quaternary sediments were deposited during the Ice Age itself, either directly from the huge ice sheets that moved from north-west to south-east or from the meltwater following the slowly melting ice sheets.

560. With reference to the GSI mapping, the subsoils underlying the Construction Working Width primarily comprise TLs, as shown in Table 4.5.

561. Quaternary deposits such as peat, lacustrine and alluvial subsoils are also present along the Construction Working Width. In east County Offaly and north County Kildare, extensive areas of cutover peat overlie glacial deposits along the Construction Working Width. Limited areas of shelly marl or lacustrine deposits were encountered during the GI works.

Table 4.5: Subsoil Classifications Along Construction Working Width

Subsoil Group	% of Construction Working Width Within Subsoil Category
Alluvium (Undifferentiated)	3.8%
Glaciofluvial sands and gravels	3.8%
Glaciolacustrine deposits (undifferentiated)	0.7%
Peat	31.1%
Till	61.6%
TOTAL	100%

4.2.9.1 Treated Water Pipeline from the WTP to the BPT

562. A large range of soils are present along the Treated Water Pipeline from the WTP to the BPT. Topsoil encountered along the route is between 0.1m to 0.6m thickness. This topsoil overlies glacial till, consisting of sandy gravelly clay with frequent cobbles, firm or stiff in the upper horizons becoming very stiff with depth. Occasional sand or gravels deposits were encountered. Peat is mapped along the Treated Water Pipeline from the WTP to the BPT, however peat was absent or shallow based on the GI works. Peaty soils and peat were encountered in a number of trial pits at PSD1, immediately north and south of the R445. Spongy fibrous and pseudo-fibrous peat variants encountered in BH-11594, BH-12406A, and BH-12658. Ground investigations related to the Treated Water Pipeline from the WTP to the BPT are included in EIAR Appendix A10.1 and Appendix A10.7.

563. The Construction Working Width is located north of the Kilmastulla River at TW – 2300 to TW – 6700. There are no proposed crossings of the Kilmastulla River. The subsoils encountered to the north of the Kilmastulla River were predominantly described as glacial till. The BH-2461 (TW – 2400) comprised firm to very stiff brown slightly sandy slightly gravelly CLAY with low cobble content extending to depths of 6.7m. Deeper subsoil material was encountered in BH-6016, located approximately 0.1km to the north of the Kilmastulla River, comprising a layer of medium dense very gravelly very silty fine to coarse SAND with low cobble content, extending to a depth of 3.4m, overlying layers of (slightly) sandy (slightly) gravelly CLAY and slightly sandy slightly clayey GRAVEL, which were firm and stiff in the upper horizons becoming very stiff with increasing depth to 21.7m bgl. This horizon was found overlying a layer of very dense grey cobbles and boulders of limestone with orangish brown sandy CLAY to a depth of 24.7m bgl.

564. The alluvial material encountered in the borehole locations at the primary river crossings are described hereunder. A crossing of the Nenagh River occurs at TW – 19450 (WCX016). The underlying subsoil material encountered at BH-19407, within the trenchless location, comprises firm becoming stiff brown slightly sandy gravelly CLAY extending to a depth of 1.1m bgl overlying a layer of dense grey sandy subangular to angular fine to coarse GRAVEL with high cobble content extending to a depth of 2.2m bgl. Shallow bedrock is present at the Nenagh River crossing. Weathered to competent LIMESTONE underlies the subsoils at 2.5m bgl, becoming strong (locally medium strong) massive grey LIMESTONE at 3.5m bgl.

565. Three areas are mapped as peat subsoils on the GSI/Teagasc data between the WTP and BPT. Based on peat probing data, peat is shallow to absent in these areas as detailed in Table 4.6.

Table 4.6: Peat Depths and Mapped Peat Lengths for the Treated Water Pipeline from the WTP to the BPT

Name of bog[16]	Chainage	Total Length (m)	Inferred Peat Depth (m)	
			Average	Maximum
Peat subsoil in private land #1	TW – 10175 to TW – 10500	325	0.3	0.8
Peat subsoil in private land #2	TW – 31500 to TW – 31650	150	No Peat	No Peat
Peat subsoil in private land #3	TW – 32825 to TW – 33550	725	No Peat	No Peat

4.2.9.2 Treated Water Pipeline from the BPT to the TPR

566. Soils encountered along the Treated Water Pipeline from the BPT to the TPR route primarily consist of topsoil, typically in 0.1m to 0.6m thickness overlying Glacial Till, consisting of layers of sandy gravelly clay with frequent cobbles, and occasional deposits of sands or gravels. A description of the subsoils on the main river crossings is given below from west to east. Ground investigation data for the Treated Water Pipeline from the BPT to the TPR is included in EIAR Appendix A10.1, EIAR Appendix 10.9, EIAR Appendix 10.11, EIAR Appendix 10.12 and EIAR Appendix 10.14.

567. Borehole data reveal soil adjacent to the Little Brosna River comprised peaty topsoil over dry black amorphous PEAT to a depth of 1.3m bgl, overlying a layer of firm wet brownish black fibrous PEAT to a depth of 2.0m bgl. This peat layer overlies a greyish black very gravelly very silty medium to coarse SAND layer (with low cobble content), extending to a depth of 6.5m bgl, with coarse sandstone and limestone GRAVEL and coarse SAND to 7.8m bgl (BH-49654).

568. At the Silver [Kilcormac] River crossing to the west of the river, topsoil overlies a layer of firm greyish brown slightly sandy slightly gravelly SILT at BH-77404 to a depth of 6.0m bgl. Gravel is subangular to rounded fine to coarse of limestone. Cobbles and boulders are of grey limestone. The BH-77477 lies to the east of the Silver River and encountered similar material, comprising a layer of topsoil over stiff brownish grey (slightly) sandy (slightly) gravelly SILT with low cobble and boulder content to a depth of 9.3m bgl, with layers of dense brown silty very sandy subangular fine to coarse limestone GRAVEL, with low cobble content.

569. Soils at the Clodiagh (Tullamore) River crossing are predominantly made up of a layer of topsoil overlying firm becoming dense (slightly) sandy (slightly) gravelly SILT or silty sandy GRAVEL, with low cobble content, extending to a depth of 10.45m bgl (BH-89604), with occasional layers of medium dense grey slightly silty gravelly fine to coarse SAND.

570. Natural deposits at the River Figile were described as peaty topsoil to a depth of 0.2m, overlying soft to very stiff, slightly sandy slightly gravelly CLAY, with varying cobble content extending to depth of 6.2m.

571. Soils at the River Liffey crossing comprise a layer of topsoil overlying interbedded layers of brown silty SAND/grey sandy SILT/ black clayey sandy GRAVEL/ grey silty sandy gravelly CLAY, with occasional cobbles to a maximum depth of 15.1m bgl (BH-161516).

572. Peat is the predominant soil group between Geashill, County Offaly and Timahoe, County Kildare (Chainage TWC – 10000 to TWD – 29400). Ground investigation data are included in EIAR Appendix A10.11. No active raised bog or degraded raised bog still capable of regeneration are present within the Construction Working Width. Ecological surveys have confirmed there are no areas of active raised bogs within the Construction Working Width (EIAR Chapter 8: Biodiversity). Where peat occurs along the Treated Water Pipeline in County Tipperary, the shallow peat areas are reclaimed and utilised for agriculture. The Treated Water Pipeline from the BPT to the TPR traverses Bord na Móna land and other

[16] Numbering as per EIAR Appendix A5.3: Method of Working in Peat

peatland sites. Additional data on the peat depths are included in EIAR Appendix A5.3, Annex A. During the initial route selection areas of active raised bog were avoided.

573. In all cases, raised bog habitats recorded within the Proposed Project had undergone drainage or cutting at some point in time and therefore did not conform with the Annex I habitat criteria for 'active raised bogs (7110)' or 'degraded raised bogs still capable of natural regeneration (7120)' (EIAR Appendix A8.4 Target Habitat Surveys Report). The total area classified as degraded raised bog (non-Annex I) is 1.1ha, or 0.09%, of habitats within the Proposed Project (EIAR Appendix A8.4: Target Habitat Surveys Report). A total of 0.4ha of the degraded raised bog relates to turbary/turf banks.

574. Bord na Móna has a significant extent of drained peatlands (approximately 15km) where peat harvesting previously occurred (Table 4.7). Bord na Móna has undertaken a programme of peatland rehabilitation across many of its bogs previously harvested for peat extraction. There are two levels of rehabilitation:

- Rehabilitation Plan under an Integrated Pollution Control (IPC) Licence; or
- Enhanced Rehabilitation Plan under PCAS.

575. The PCAS, provides for the restoration and rehabilitation of approximately 33,000 hectares of Bord na Móna peatlands that were previously harvested. Details of the PCAS schemes are included in Table 4.7.

576. For three of the bogs - Ballydermot, Timahoe North and Gilltown - Bord na Móna are currently preparing Rehabilitation Plans. Two of these sites, Ballydermot and Gilltown, do not have Enhanced Rehabilitation Plans under PCAS. Timahoe North does have an enhanced plan.

577. For all of the remaining sites Bord na Móna have published Enhanced Rehabilitation Plans for each of these bogs in 2021[17] and 2022[18].

578. Outside of the Bord na Móna lands, private turf cutting is limited but ongoing where degraded raised bog is present. Approximately 60m of degraded raised bog occurs at TWC – 17300 and 20m at TWC – 23530. Peat was also historically extracted (milled peat extraction) at Kilcumber Bog, County Offaly. Peat extraction has ceased in Kilcumber since 2019.

579. Details of the Bord na Móna and private commercial peatlands crossed are shown in Table 4.7. While peat depths vary across the peatland sites, in general peat is less than 3m deep with deeper areas present on the Bord na Móna headlands.

Table 4.7: Summary of Main Cutover Peatland Along the Construction Working Width

Peatland	Bog Group	Chainage	Rehabilitation/PCAS	Description and Current Land Uses	Figure Reference
Clonad Bog, County Offaly	Allen group – EPA licence P0503-01	TWC – 11850 to TWC – 13400	Rehabilitation and PCAS measures implemented.	Cutover peat – all peat harvesting ceased in 2020. PCAS measures implemented.	EIAR Figure 10.3 and 10.105
Mount Lucas, County Offaly	Allen group – EPA licence P0503-01	TWC – 13400 to TWC – 17200	Rehabilitation and PCAS measures implemented.	Cutover peat and windfarm. PCAS measures implemented.	EIAR Figure 10.3 and 10.105
Esker, County Offaly	Allen group – EPA licence P0503-01	TWC – 20275 to TWC – 21300 and TWC – 23200 to TWC – 23475	Rehabilitation and PCAS measures implemented.	Cutover peat – peat harvesting ceased in 2019. PCAS measures implemented.	EIAR Figure 10.3 and 10.106

[17] https://www.bnmpcas.ie/bogs-peatlands-climate-action-scheme/

[18] https://www.bnmpcas.ie/2022bogsrehabilitation/

Peatland	Bog Group	Chainage	Rehabilitation/PCAS	Description and Current Land Uses	Figure Reference
Cloncreen, County Offaly	Allen group – EPA licence P0503-01	TWD – 2200 to TWD – 2950	Rehabilitation and PCAS measures implemented.	Cutover peat – peat harvesting ceased in 2020, Cloncreen windfarm in operation from 2022. PCAS and rehabilitation measures outside of Construction Working Width.	EIAR Figure 10.106 and 10.107
Kilcumber, County Offaly	NA – Private Bog	TWD – 4200 to TWD – 6400	No rehabilitation plans as Private Lands.	Cutover peat (peat harvesting ceased in 2019). Cushaling windfarm constructed in 2024/2025.	EIAR Figure 10.3 and 10.107
Ballydermot Bog - Codd 1 and Codd 2 Glashabaun North Glashabaun South Derrybrennan, County Kildare	Allen group – EPA licence P0503-01 Codd, Derrybrennan and Glashabaun bogs also known as Ballydermot Bog	TWD – 6400 to TWD – 8500 TWD – 9400 to TWD – 15000	Decommissioned – Draft rehabilitation plan (works have started on site).	Cutover peat – peat harvesting ceased in 2020. Proposed wind farm and rehabilitation plan (rehabilitation plan will be finalised alongside windfarm proposals).	EIAR Figure 10.3 and 10.108
Timahoe South, County Kildare	Allen group – EPA licence P0503-01	TWD – 17200 TWD – 18900 to TWD – 21550	Rehabilitation and PCAS plans in place but works not complete.	Natural regeneration with some forestry. Rehabilitation and PCAS measures ongoing.	EIAR Figure 10.3 and 10.110
Timahoe North, County Kildare	Allen group – EPA licence P0503-01	TWD – 21550 to TWD – 23650 TWD – 24300	Proposed rehabilitation plan and PCAS measures (work is on-going on the Enhanced Rehabilitation Plan)	Natural regeneration with access roads and some forestry. Solar farm under construction to the west of Construction Working Width.	EIAR Figure 10.3 and 10.110
Gilltown, County Kildare	Kilberry Group – P0506-01	TWD – 26500 to TWD – 27300	Rehabilitation measures proposed.	Natural regeneration with some forestry.	EIAR Figure 10.4 and 10.110

580. At Clonad Bog, peat depths are greater towards the south-west corner of the site. Industrial milled peat production ceased in 2020 with rehabilitation measures implemented in 2022. Milled peat was previously utilised in the ESB power stations in the Midlands and west. Some of the peat is redder and may be somewhat more acidic or younger. Within the production footprint of Clonad Bog, the majority of the remnant peat is shallow, with less than 1m of peat remaining and much of the eastern production area would be considered to be cutaway. Peat depth is 1.7m on average. Areas of underlying till are exposed in a number of areas. However, deeper peat remains in the south-west corner of the site, where peat depths are between 2 and 5m deep, along the eastern headland adjacent to the local road.

581. No active raised bog occurs in the Construction Working Width at Clonad Bog. An area of deeper degraded raised bog (non-Annex I) is located to the north of an access track which forms the boundary of the Construction Working Width at TWC – 11900 to TWC – 13350. Extensive drainage occurs along the local road and access road. Groundwater levels in the peatland were monitored at the boundary in June to August 2021. Results are included in Appendix A10.15. Groundwater levels were between 0.3 and 0.4m bgl. The site is generally of level topography, with ground slopes ranging from flat to 1/50 gradient (to the horizontal) across the landholding. Image 10.2 is taken at Clonad Bog TWC - 13250 and is representative of the cutover bogs with revegetation occurring in the drainage channels following drain blocking. The peat fields would revegetate as the rehabilitation plan progress.

582. At Mount Lucas Bog, peat production commenced in the mid-1970's and finished in 2018. Peat depths across the older cutaway section are shallow for the most part (<0.5m), with sections being almost completely cutaway, having exposed subsoils. The average peat depth is 1.5m with deeper peat (2m to 2.8m) along the headlands. Areas of underlying till are exposed in a number of peat drains. No active raised bog occurs in the Construction Working Width at Mount Lucas Bog. An area of deeper degraded

raised bog (6.3m), is located to the north of an access track which forms the boundary of the Construction Working Width at TWC - 13400. The remnant peat is partially drained due to the presence of a bog railway and access road. Groundwater levels in the peatland were monitored at the boundary in 2021 and in 2023. Groundwater levels were between 0.3m bgl and 0.55m bgl. The site is generally of level topography, with ground slopes ranging from flat to 1/50 gradient (to the horizontal) across the landholding. A turbary peat bank (<80m) is located outside of the Bord na Móna boundary, adjacent to the existing Bord na Móna rail track. Peat depths to the north of the Bord na Móna boundary are up to >4m in the turbary section (TWC – 17300).

583. At Esker Bog, the western section contains the deepest peat reserves with over 2.5m of peat remaining in some areas to the south of the bog. The eastern section has rather shallower peat depths remaining, with some fen peats exposed. Some of this area is also cutaway, with underlying sub-soils now exposed. The peat soils are likely to be underlain with till derived from limestones, as these subsoils are exposed around the margins of the site. The average peat depth is 1.5m with deeper peat (2 to 3.8m) along the southern headland. A short section (<30m) of turbary peat is located outside of the Bord na Móna boundary. Peat depths are up to 4.3m in the turbary section (TWC – 23450) and the south-west portion, where some remaining peat up to 2m deep is present. The subsoils along the southern margin are limestone-based sands and gravels lain down by the Esker River. Grey shelly Marl and till was exposed in some of the spoil taken from the silt ponds at the southern end of the site indicating the presence of marl and till at shallow depths. No remaining active or degraded raised bog occurs within the Construction Working Width. The site is generally of level topography, with ground slopes ranging from flat to 1/100 gradient degrees (to the horizontal) across the landholding.

584. At Cloncreen Bog, a wind farm was developed in 2021/2022. Industrial milled peat production ceased at Cloncreen in 2018 with rehabilitation measures implemented in 2022. The average peat depth is 1.8m with deeper peat (2m to 3m) along the eastern headland. Peats depths at the headland crossed by the Treated Water Pipeline from the BPT to the TPR (TWD – 2400 to TWD – 2800) are between 2m to 3m deep. Areas of underlying till are exposed in a number of peat drains. No remaining active or degraded raised bog occurs within the Construction Working Width. The site is generally of level topography, with ground slopes ranging from flat to 1/100 gradient (to the horizontal) across the landholding.

585. Kilcumber Bog is a private peat bog located to the south of the River Figile from TWD – 4200 to TWD – 6400 Peat depths are on average 0.9m and underlain by tills comprising soft to firm grey very sandy SILT. Peats depths at the headland crossed by the Treated Water Pipeline from the BPT to the TPR are 1.5m to 3m deep. Areas of underlying till are exposed in a number of peat drains. No active raised bog or degraded raised bog occurs within the Construction Working Width. Kilcumber/Cloncan Bog is generally of level topography, with ground slopes ranging from flat to 1/50 gradient (to the horizontal) across the landholding. The nine-turbine Cushaling wind farm has recently been constructed on the cutaway bog. The pipeline would be located along the adjacent wind farm access road.

586. At Codd 1&2/Sheridans Bog, peat depths in Codd North are generally less than 1m and underlain by tills. Peat depths at the headlands crossed by the Treated Water Pipeline from the BPT to the TPR (TWD – 6600 to TWD – 8700) are between 1m to 2.5m deep. Areas of underlying till are exposed in a number of peat drains. No active raised bog or degraded raised bog occurs within the Codd/Sheridan bog. The site is generally of level topography, with ground slopes ranging from flat to 1/50 gradient (to the horizontal) across the landholding. Ballydermot Wind farm is currently proposed for Codd North and extends to Glashabaun. Industrial milled peat production ceased at Codd in 2020.

587. At Glashabaun South Bog, industrial milled peat production ceased in 2019/2020. Glashabaun South Bog is separated from Glashabaun North Bog by the Cushaling River corridor. It is contiguous with the Derrybrennan Bog to the north-east. Glashabaun South Bog comprises mostly regenerating cutaway bog and conifer forest. Areas of underlying till are exposed in a number of peat drains. The regenerating bog is mostly dry, heath type vegetation and scrub. A number of deep drains are present on the bog.

Peat depths in Glashabaun South are generally greater than 2m and underlain by moderately firm to soft, grey sandy gravelly SILT. Peats depths along the Treated Water Pipeline from the BPT to the TPR (TWD – 9500 to TWD – 12700) are between 1m to 2.5m deep. No active raised bog or degraded raised bog occurs within the Glashabaun site. Glashabaun South Bog is of level topography, with ground slopes from flat to 1/50 gradient (to the horizontal) across the landholding.

588. At Derrybrennan Bog, a wind farm project is currently (2024) proposed. Industrial milled peat production ceased at Derrybrennan in 2020. Derrybrennan Bog comprises mostly regenerating cutaway bog and conifer forest. The regenerating bog is mostly dry, heath type vegetation and scrub. A number of deep drains are present on the bog. The peatland to the north of the Abbeylough River is reclaimed for agricultural use. Peat depths in Derrybrennan are generally less than 2m and underlain by moderately firm to soft, greyish brown CLAY and sandy gravelly SILT. Peats depths along the Treated Water Pipeline from the BPT to the TPR (TWD – 12700 to TWD – 15000) are between 1m to 2.5m deep. The Grand Canal is located to the north of the Derrybrennan Bog. No active raised bog or degraded raised bog (Annex I) occurs within the Derrybrennan Bog. The site is generally of level topography, with ground slopes ranging from flat to 1/50 gradient (to the horizontal) across the landholding.

589. At Timahoe South Bog, the Proposed Project passes along the western boundary. The bog was used primarily for the industrial exploitation of peat. Industrial production ceased in 1990. Small-scale production for domestic purposes continued at the margins of the commercially cut away bog until 2020. The peat was removed from the bog via a railway system, with many of the tracks, or sections of them still in place. Peat depths along the Treated Water Pipeline from the BPT to the TPR (TWD – 18900 to TWD – 21550) are between 0.5m to 2.2m deep. Deeper peat occurs in the peat headlands. Shallow peat to the west of the peatland is currently in agricultural land use. During the initial route selection areas of active raised bog were avoided. No active raised bog or degraded raised bog occurs within the Construction Working Width at Timahoe South. The site is generally of level topography, with ground slopes ranging from flat to 1/50 gradient (to the horizontal) across the landholding.

590. At Timahoe North Bog, the Proposed Project passes along the southern and western boundary of Timahoe North. The bog was used primarily for the industrial exploitation of peat. Industrial production ceased in 1990. Small-scale production for domestic purposes continued outside of the Bord na Móna site. A solar farm was constructed (2022 to 2024) to the north and north-west of the Proposed Project and entered commercial operation in April 2025. The peat was removed from the bog via a railway system, with many of the tracks, or sections of them still in place. Peat depths along the Treated Water Pipeline from the BPT to the TPR (TWD – 21550 to TWD – 23650) are between 1m to 2.2m deep. Shallow peat to the west of the Bord na Móna peatland is currently in agricultural land use.

591. An area of deeper remnant peat is located to the west of the Timahoe Solar farm access track at TWD – 21550 to TWD – 22200 at Drumachon Bog, Timahoe, County Kildare (EIAR Appendix A8.4: Targeted Habitat Surveys Report). Annex I habitat is located to the northwest of Timahoe South and within the overall Timahoe North Bog. An area of active raised bog is located approximately 280m from the Proposed Project. The active raised bog and Proposed Project are separated by extensive drains along a local road and an access road for the Timahoe 110kV substation and solar farm. Peatland water levels in the peatland were monitored at the boundary in June to August 2021. Peatland water levels within the Construction Working Width were between 0.3m and 0.4m bgl. The site is generally of level topography, with ground slopes ranging from flat to 1/50 gradient (to the horizontal) across the landholding. An area of degraded raised bog (non-Annex I) is located TWC – 21550.

592. At Gilltown Bog, the Proposed Project passes through the northern boundary of the bog. The bog was used primarily for the industrial exploitation of peat. Industrial production ceased in 2020. The remaining peat is relatively deep to the south and centre of Gilltown Bog. Peat depths along the Treated Water Pipeline from the BPT to the TPR (TWD – 26500 to TWD – 27300) are between 0.3m to 5.6m deep. Shallow peat to the east of the peatland is currently in agricultural land use. No active raised bog or

degraded raised bog (Annex I) occurs within the Construction Working Width. The site is generally of level topography, with ground slopes ranging from flat to 1/50 gradient (to the horizontal) across the landholding.

Table 4.8: Peat Depths and Mapped Peat Length (TWA – 0 to TWE – 17500)

Name of Bog[1]	Chainage	Total Length (m)	Inferred Peat Depth (m)[2]	
			Average	Maximum
Peat subsoil in private land #4	TWA – 3550 to TWA – 3575	25	0.2	0.6
Peat subsoil in private land #5	TWA – 3875 to TWA – 4900	850	0.5	2.5
Peat subsoil in private land #6	TWA – 5300 to TWA – 5950	650	0.9	2.1
Peat subsoil in private land #7	TWA – 8675 to TWA – 8675	0	0.0	0.4
Peat subsoil in private land #8	TWA – 9275 to TWA – 9500	225	0.5	0.9
Peat subsoil in private land #9	TWA – 12700 to TWA – 13500	600	1.6	3.2
Peat subsoil in private land #10	TWA – 19225 to TWA – 20300	500	0.3	0.8
Peat subsoil in private land #11	TWA – 20975 to TWA – 21600	625	0.4	0.6
Peat subsoil in private land #12	TWA – 22800 to TWA – 24025	825	0.4	0.8
Peat subsoil in private land #13	TWA – 27625 to TWA – 27925	300	No Data	No Data
Peat subsoil in private land #14	TWB – 6075 to TWB – 6875	800	1.0	2.0
Peat subsoil in private land #15	TWB – 8925 to TWB – 9500	400	0.4	0.7
Peat subsoil in private land #16	TWB – 10825 to TWB – 10950	125	0.5	0.7
Peat subsoil in private land #17	TWB – 12700 to TWB – 12775	75	0.2	0.7
Peat subsoil in private land #18	TWB – 13175 to TWB – 13650	475	0.5	1.1
Peat subsoil in private land #19	TWB – 14000 to TWB – 14275	275	0.4	0.9
Peat subsoil in private land #20	TWB – 14750 to TWB – 15425	675	0.5	0.9
Peat subsoil in private land #21	TWB – 18475 to TWB – 23350	4,075	0.2	1.0
Peat subsoil in private land #22	TWB – 24975 to TWB – 25525	550	0.3	0.9
Peat subsoil in private land #23	TWC – 8750 to TWC – 8925	175	1.0	1.0
Peat subsoil in private land #24	TWC – 9725 to TWC – 10425	700	0.3	0.7
Peat subsoil in private land #25	TWC – 11025 to TWC – 11600	575	0.2	0.8
Clonad Bog	TWC – 11850 to TWC – 13400	1,550	1.5	4.6
Mount Lucas Bog	TWC – 13425 to TWC – 17100	3,575	1.0	2.8
Peat subsoil in private land #26	TWC – 17125 to TWC – 17800	675	2.9	6.2
Peat subsoil in private land #27	TWC – 18825 to TWC – 19100	275	0.4	0.9
Peat subsoil in private land #28	TWC – 19250 to TWC – 20250	1,000	0.3	0.5
Esker Bog	TWC – 20275 to TWC – 21300	1,025	2.4	3.5
Peat subsoil in private land #29	TWC – 21325 to TWC – 23175	1,850	0.8	3.0
Esker Bog	TWC – 23200 to TWC – 23475	275	1.2	2.4
Peat subsoil in private land #30	TWC – 23500 to TWC – 24450	950	2.2	4.9
Peat subsoil in private land #31	TWD – 150 to TWD – 425	275	0.2	0.2
Peat subsoil in private land #32	TWD – 1900 to TWD – 2175	275	0.4	0.8
Cloncreen Bog	TWD – 2450 to TWD – 2900	450	2.2	4.5
Peat subsoil in private land #33	TWD – 2925 to TWD – 6375	3,450	1.0	4.5
Ballydermot Bog	TWD – 6400 to TWD – 14375	7,975	1.6	4.0
Peat subsoil in private land #34	TWD – 14400 to TWD – 16800	800	1.0	3.0
Peat subsoil in private land #35	TWD – 16800 to TWD – 18500	800	0.3	1.0

Name of Bog[1]	Chainage	Total Length (m)	Inferred Peat Depth (m)[2]	
			Average	Maximum
Peat subsoil in private land #36	TWD – 18500 to TWD – 18900	400	0.3	0.4
Timahoe South Bog	TWD – 18925 to TWD – 21500	2,575	1.0	4.5
Timahoe North Bog	TWD – 21525 to TWD – 23900	2,375	2.0	5.5
Timahoe North Bog	TWD – 23925 to TWD – 25225	1,275	0.6	2.5
Peat subsoil in private land #37	TWD – 25425 to TWD – 26475	1,000	1.6	4.1
Gilltown Bog	TWD – 26500 to TWD – 26975	475	3.0	5.6
Gilltown Bog	TWD – 27000 to TWD – 27300	300	1.7	3.0
Peat subsoil in private land #38	TWD – 27325 to TWD – 29325	2000	1.5	4.4

Table notes:

[1] Peat subsoils #1-3 in Table 4.6

[2] Note, peat probe data may overestimate depth of peat where it is underlain by soft tills or lacustrine deposits

593. Alluvial soils are mapped along the surface water features along the Construction Working Width. In particular, deep alluvial soils are evident along the WTP access road, River Camcor, County Offaly (EIAR Figure 10.2) and the River Liffey floodplain, County Kildare (EIAR Figure 10.4).

4.2.10 38 kV Uprate Works

594. A large range of soils are present along the 38 kV Uprate Works. The principal soil groups within the defined study area are:

- AminDW – Deep, well drained mineral soil derived from mainly non-calcareous parent materials
- AminPD – Deep, poorly drained mineral soil derived from mainly acidic parent materials
- MarSed – Marine/Estuarine Sediments.

595. The following soil groups also occur, but are less widespread:

- AminSP – Shallow, poorly drained mineral soil derived from mainly acidic parent materials
- AminSPPT – Peaty, shallow poorly drained mineral soil derived from mainly acidic parent materials
- AminSRPT – Shallow, reasonably drained mineral soil derived from mainly acidic parent materials
- AlluvMIN – Mineral Alluvium
- Cut – Cutover peat
- Lac-Alluvium, lacustrine type soil
- Made Ground.

596. General information concerning the Quaternary (Subsoil) Geology is contained on the GSI website (GSI n.d.). Generally, the subsoils are derived from the underlying parent bedrock and were deposited as a result of glacio-fluvial activity. Most of the Quaternary sediments were deposited during the Ice Age itself, either directly from the ice sheets that moved from north to south or from the meltwater following the slowly melting ice sheets. A number of glacio-fluvial terraces are located east of Birdhill and to the west and south of Montpelier/O'Briensbridge.

597. With reference to the EPA online mapping (EPA 2025a), the subsoils within the study area primarily comprise till derived from Devonian sandstones/shales (TDSs), and tills derived from Lower Palaeozoic shales/sandstones (TLPDSs), underlying the 38 kV Uprate Works.

598. Quaternary deposits such as peat, lacustrine, and alluvial soils are also present within the defined study area. East of the River Shannon, areas of cutover peat overlie a mixture of marl and glacial deposits along the defined study area. No blanket peat occurs along the 38 kV Uprate Works.

4.2.11 European Sites

599. As mentioned, a hydrogeological assessment was undertaken to inform the impact assessment for the Proposed Project. Based on the site walkover and borehole data, deep soils were found to underlie the RWI&PS site, thereby limiting potential hydrogeological links to the Lower River Shannon SAC. There are no Groundwater Dependent Terrestrial Ecosystems (GWDTE) located at the RWI&PS. There are also no SAC GWDTE water bodies (i.e. delineated groundwater zones) within the footprint of the proposed infrastructure sites or along the route of the pipeline. Groundwater Dependent Terrestrial Ecosystems within the ZoI of the Proposed Project are discussed in more detail in Section 5.1.2.3. The sensitivity of each European site with GWDTE receptors is based on topographic information and GI data. The zones of groundwater contribution to each identified potential GWDTE have been identified as areas that are likely to supply GWDTEs.

600. There are no proposed discharges to groundwater as a result of the Operational Phase of the Proposed Project, including repair and maintenance. All infrastructure and the proposed pipeline would be designed to be watertight. The pipeline would be designed and constructed to minimise the possibility of any leaks. If there is a ‘break’ on the proposed pipeline this would not be a catastrophic failure, as the chosen pipeline material is steel where characteristic ‘failure’ of the pipe is a pinhole which would not lead to significant losses of water. Monitoring equipment on the pipeline would be able to detect these losses and would enable operations personnel to react rapidly. Discharges to surface water would occur during the Construction Phase and Operational Phase (as described in Section 3.6.3.9 and Section 3.8). These discharges are discussed further in Section 5.

601. The assessment of groundwater-related significant effects includes the degree of sensitivity of the GWDTE to changes in groundwater-related factors. In terms of quality, only infrastructure within the capture zone of the GWDTE is considered relevant. In terms of water levels, groundwater pressures may affect a wetland downgradient of the capture zone of the GWDTE. This is discussed further in Section 5.1.2.3.1 and Section 5.1.2.3.2.

4.3 Ecological Environment

602. The following section describes the receiving ecological environment within the study area and the wider the ZoI of the Proposed Project (Section 2.2 and Section 2.3). As noted in Section 2.5, some surveys were not required to be repeated due to the data remaining valid upon verification, or where surveys were replaced by an alternative survey type. The surveys undertaken are considered to be sufficiently robust and current to accurately inform this assessment.

4.3.1 Raw Water Intake and Pumping Station

4.3.1.1 Habitats

603. Parteen Basin (the location for the proposed RWI&PS) water levels are controlled by the weirs at its outflow, diverting water down the Old River Shannon or the headrace to Ardnacrusha Generating Station. Retaining embankments associated with the weir line occur on both the eastern and western edges of the lake, with the eastern lake embankment encompassing a larger area of the lake edge habitat. To facilitate the construction of the eastern embankment, the Kilmastulla River was diverted to run behind and parallel to the embankment, bypassing Parteen Weir and flowing into the Old River Shannon downstream of the weirs. A larger area of fringe habitats (mainly reedbeds) occur along the western edge of the basin, compared with the eastern area, due to a combination of maintenance works and a

steep drop along the embankments. Strips of woodland are present in the north-east (above the retaining embankment) as far as Ballina and on the western lake edge close to Killaloe.

604. Parteen Basin is designated as an HMWB, (i.e. a body of water which as a result of significant physical alterations by human activity, is substantially changed in character and cannot therefore meet good ecological status, e.g. dammed river) for WFD purposes (EPA 2025b). Despite this, Parteen Basin has been assigned as having Good ecological potential in the 2013 to 2018 ecological classification of Irish lakes for the WFD (EPA 2025b). Parteen Basin is approximately 4.5km in length, with a surface area of 360ha and maximum depth of 22m. The lake is categorised as typology class 12 (as designated by the EPA for the purposes of the WFD), i.e. deep (>4m), greater than 50ha and high alkalinity (>100mg/l $CaCO_3$) (Kelly *et al.* 2017a).

605. Five Annex I lake habitats are recognised as occurring in Ireland (O'Connor 2015), including '*3140 Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.*' which is described within the EU Habitat Interpretation Manual (European Commission 2013) as '*Lakes and pools with waters fairly rich in dissolved bases (pH often 6-7) or with mostly blue to greenish, very clear, waters, poor (to moderate) in nutrients, base-rich (pH often >7.5). The bottom of these unpolluted water bodies are covered with charophyte, Chara and Nitella, algal carpets*.' The Lower River Shannon SAC does not include any Annex I lake habitats as qualifying interests, nor does Parteen Basin conform to any Annex I lake habitats, particularly '*3140 Hard oligo-mesotrophic waters with benthic vegetation of Chara spp*', which is most similar to the characteristics of Parteen Basin. A comparative analysis of the conformity of Parteen Basin to the Annex I habitat is presented in Appendix G (Parteen Basin Habitat 3140 Conformity). The results of this analysis show Parteen Basin has a euphotic depth outside of the range expected for Habitat 3140, does not support any zonation in Charophytes, and is dominated throughout by angiosperms. It does support a thin covering of krustenstein and has a limited amount of charophyte growth which is indicative of its high alkalinity. As mentioned, Parteen Basin is a HMWB, effectively a reservoir, which is underlain by dark muddy limestone shale overlain by quaternary sediments and till deposits. There is no exposed karstified limestone in the basin. Thus, the basin does not conform to the standard classification of Habitat 3140 as a natural water body in a karstified limestone environment.

606. The aquatic footprint of the RWI&PS is gently shelving with the upper shore comprising cobble and gravel. This profile is relatively uniform both upstream and downstream of the RWI&PS basin. The lakebed gently dips to a depth of approximately 5m at a distance of 50m offshore. At about 1m depth of water, the substrate changes from cobble and gravel to a silty, sandy gravel with scattered cobble and small boulder. This continues to a depth of approximately 2.5m where it becomes a silty sand, while from 3m and deeper it comprises a fine silt. The shallow upper shore zone (to approximately 0.5m) had cobbles covered with krustenstein – a blue-green algal crust associated with oligotrophic alkaline waters. Algal cover was seen to increase slightly during scuba surveys undertaken between 2017 and 2024. The substrate had a dense covering of horned pondweed (*Zannichellia palustris*) with small amounts of stonewort (*Chara virgata*). Greater water-moss (*Fontinalis antipyretica*) was present, though primarily confined to the roots of fringing trees that are exposed on the lake shore. The truly aquatic greater water-moss, considered a characteristic species of 'Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion vegetation*' (a qualifying interest habitat for the Lower River Shannon SAC), is an aquatic generalist that can be found from some metres depth in lakes to periodically inundated areas, or just above it (Lockhart *et al.* 2012). Greater water-moss is very common in lakes as well as in rivers. Although it is considered a characteristic species of 'Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion vegetation*', its presence is not considered an indicator of the presence of this Annex I habitat. Floating river vegetation habitat is largely confined to rivers. Furthermore, Parteen Basin is also classified as a HMWB (Reservoir FL7) and is subject to greater variation in water level than a natural lake. At depths of 1.0 to 1.5m, small amounts of stonewort are present, though much of it appeared to be unrooted drift material. Yellow water lily (*Nuphar lutea*) and the submerged form of bulrush (*Typha latifolia*) were occasional to frequent, and the submerged form of arrowhead (*Sagittaria sagittifolia*) formed isolated dense stands. Both shining

pondweed (*Potamogeton lucens*) and perfoliate pondweed (*P. perfoliatus*) occurred in small amounts along with Nuttall's waterweed (*Elodea nuttallii*). Cobbles still retained some krustenstein cover. In water with depths of 1.5m to 2.5m, both bulrush and arrowhead formed dense stands with occasional clumps of yellow waterlily. The bulrush formed emergent reed beds while the arrowhead remained in submerged form. Both dominant species thinned out towards 3.0m depth and small amounts of ivy-leaved duckweed (*Lemna trisulca*) occurred on the lakebed. No macrophytes were recorded below 3.5m (euphotic depth) (EIAR Appendix A8.17: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2017), EIAR Appendix A8.18: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2019), EIAR Appendix A8.19: Aquatic Invasive Species Survey Report, and EIAR Appendix A8.23: Aquatic Invasive Species and Macrophyte Survey at Lough Derg and Parteen Basin).

607. The terrestrial footprint of the RWI&PS was surveyed by Dr. Peter Foss (wetland specialist with Wetland Survey Ireland) in June 2016 (Appendix H: Parteen Basin Habitat Assessment) and by Dr. John Cross (woodland specialist, former NPWS Project Officer) in October 2016 (Appendix I: Assessment of the Woodland Near Parteen Weir). The results of both surveys found the site is characterised as an old conifer plantation, largely wind-thrown, in which native species have become established. The land is elevated about 1m above the height of the adjacent reservoir and is more or less level but uneven, with cultivation ridges, probably dating from the time of planting of the conifers. The conifers are approximately 40 years old. The principal species in the canopy are Sitka spruce (*Picea sitchensis*) and grey willow (*Salix cinerea*) with occasional ash (*Fraxinus excelsior*) and, rarely, alder (*Alnus glutinosa*) (Nomenclature is in accordance with Preston *et al.* (2002)). The thin shrub layer consists of hazel (*Corylus avellana*) with a little hawthorn (*Crataegus monogyna*). The ground flora is poorly developed with wood sorrel (*Oxalis acetosella*) and locally bracken (*Pteridium aquilinum*) being the principal species. The results of these surveys were verified as unchanged during subsequent visits between 2017 and 2025.

608. Based on the National Survey of Native Woodlands (Perrin *et al.* 2008) five alluvial woodland vegetation types have been identified in lowland situations within Ireland:

- Woodlands of alder and ash, often with sally, along lowland reaches of slow-flowing rivers
- Woodlands of alder, ash and sally around lake shores
- Woodlands of alder, ash and sally around springs and seepage areas associated with rivers or lakes
- Woodlands of (narrow-leaved) tree willows alongside slow-flowing reaches of large rivers, often in reaches subject to tidal influence
- Woodlands of pedunculate oak and ash sometimes with alder.

609. In Perrin *et al.* (2008), for each Annex I habitat assessment, three parameters were scored: area, structure and functions, and future prospects. The detailed assessment criteria that should be utilised for monitoring alluvial woodlands are presented in Table A4 in Perrin *et al.* (2008). The woodland at the proposed RWI&PS might be expected to fall into the Habitats Directive type 'Riparian forests of ash (*Fraxinus excelsior*) and alder (*Alnus glutinosa*) of temperate and Boreal Europe lowland and hill watercourses' (a qualifying interest habitat for the Lower River Shannon SAC) and types 1 or 2 listed above. However, the water level in the reservoir is controlled by the dam and only fluctuates by about 45cm. The water level on the day of the survey (October 2016) was approximately 33.27m. This is approximately 0.13m lower than at Killaloe on the same day and 0.93m below the highest level recorded at Killaloe since 1932. Consequently, given the height of the woodland above the water level it would not appear to be subject to flooding even at times of highest flood. This is confirmed by the vegetation, which does not conform to any of the vegetation types above, based on the Perrin *et al.* (2008) assessment criteria, even allowing for the dominance of Sitka spruce, as well as by the absence of detritus which is characteristically left by high water. Further, the National Flood Hazard Map shows no record of flooding

in this area since 1954, despite extensive flooding along the Shannon in recent years. Therefore, the site is not alluvial woodland but is mixed deciduous conifer woodland (as noted above) that is gradually reverting to ash-hazel woodland.

4.3.1.2 Species

610. Parteen Basin and Lough Derg have been partially designated as the Lower River Shannon SAC and are of conservation interest for their fish species, including all three species of lamprey (qualifying interests of the Lower River Shannon SAC) which have all been observed spawning in the Lower River Shannon and its tributaries. As mentioned in Section 2.5.1.6.2, a series of 15cm cores were taken at the proposed RWI&PS site in soft substrates at depths from approximately 2m to 3.5m to check for lamprey ammocoetes. No ammocoetes were retrieved from any of the cores taken and there was no visible evidence of ammocoete burrows recorded in any of the soft sediments (EIAR Appendix A8.17: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2017) and EIAR Appendix A8.18: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2019)). There is no suitable spawning habitat for lamprey species in Parteen Basin and the nearest suitable spawning habitat for lamprey is approximately 5km upstream of Killaloe in the Annacarriga River. There is therefore no immediate source of lamprey ammocoetes at the proposed RWI&PS site. Furthermore, no lamprey species were recorded during the National Research Survey Programme Fish Stock Survey of Parteen Basin and Lough Derg, carried out by IFI in June and July 2016 (EIAR Appendices A8.15: National Research Survey Programme Lakes 2016: Parteen Basin (Lower Lough Derg, Inland Fisheries Ireland Report and EIAR Appendix A8.16: National Research Survey Programme Lakes 2016: Lough Derg, Inland Fisheries Ireland Report).

611. One individual Atlantic salmon (a qualifying interest of the Lower River Shannon SAC; measured at 75cm) was recorded in the pelagic zone of Parteen Basin during the fish stock assessment in 2016 (EIAR Appendix A8.15: National Research Survey Programme Parteen Basin July 2016). No suitable spawning habitat for salmon was found during the aquatic ecological survey at the RWI&PS site (EIAR Appendix A8.17: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2017) and EIAR Appendix A8.18: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2019)). The nearest suitable spawning habitat to Parteen Basin for salmon is approximately 5km upstream of Killaloe in the Annacarriga River. However, the beds of bulrush and arrowhead recorded in the study area of the RWI&PS site provide potential spawning habitat for various coarse fish species (EIAR Appendix A8.17: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2017) and EIAR Appendix A8.18: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2019)). The following coarse fish species were recorded in Parteen Basin during the fish stock survey in 2016: roach, perch, pike, and the roach x bream hybrid (EIAR Appendix A8.15: National Research Survey Programme Parteen Basin July 2016).

612. A benthic invertebrate survey was carried out at Parteen Basin in August 2016 to determine the baseline scenario. In total, 34 taxa were recorded, many of which were as single individuals at a small number of sites. The most abundant species was the INNS zebra mussel which occurred at 10 of the 12 stations, whereby the highest number of individuals were recorded at station 10 where 10,960 individuals were noted. Additional species recorded included duck mussel (*Andodonta anatine (L))* which is noted as a 'Vulnerable' species (Byrne *et al.* 2009) due to the invasion of zebra mussel. Cluster analysis of the data collected illustrated the three characterising species for stations 1 to 7, 11 and 12 were Chironomidae, *Limnodrilus* and *Spirosperma ferox* and stations 8, 9 and 10 were *Asellus aquaticus, Dreissena polymorpha* and *Dendrocoelum lacteum.* Asian clam have been found to occur in Lough Derg, however, surveys of lower Lough Derg and Parteen Basin did not reveal any Asian clams (EIAR Appendix A8.19: Aquatic Invasive Species Survey Report and EIAR Appendix A8.23: Aquatic Invasive Species and Macrophyte Survey at Lough Derg and Parteen Basin).

613. Signs of otter (spraints, trails, couches, tracks, or slides), a qualifying interest for the Lower River Shannon SAC, were recorded along the western and south-eastern shore of Parteen Basin and along the Kilmastulla River during verification surveys to inform the design of the Proposed Project; however, no signs of otter activity were recorded within the study area of the RWI&PS site and there was no evidence of any holts or couches.

614. The habitats within the Proposed Project were found to support populations of all nine species of bat found in Ireland (EIAR Appendix A8.9: Bat Surveys Report). These are: common, soprano and nathusius pipistrelles (*Pipistrellis nathusii*), Leisler's bat, Daubenton's bat, Natterer's bat, brown long-eared bat, lesser horseshoe bat, and whiskered bat. No lesser horseshoe bats (the only Annex II bat species) were recorded during the field surveys between 2016 and 2024 at the RWI&PS. Lesser horseshoe bat was only recorded once during the array of surveys, and this was located north-west of Birdhill at the WTP site. This species' territory is the six western seaboard counties which does not include County Tipperary. However, the location is approximately 2km from County Clare which is a commutable distance for this species of bat. A previous lesser horseshoe bat recorded was recorded in Ballina, County Tipperary and this was a male individual rescued by the local NPWS Conservation Ranger (pers. comm. Dr. Áine Lynch). The Proposed Project is not located within the normal commuting range for lesser horseshoe bats associated with any European site (i.e. they are no European sites within the ZoI of the Proposed Project designated for this species).

615. The breeding bird surveys carried out at Parteen Basin in 2016 to 2024 (Table 2.2 and Section 2.5.1.4) recorded the following bird species which are listed as special conservation interest species of the nearby Lough Derg (Shannon) SPA: tufted duck, cormorant and common tern (*Sterna hirundo*) (EIAR Appendix A8.21: Breeding Bird Survey Summary Report). None of these species were recorded using habitat in the footprint of the RWI&PS. The majority of observations were of birds using the western (more natural) side of Parteen Basin rather than the eastern (man-made) embankment, where the RWI&PS is located. Tufted duck is a probable breeding species at Lough Derg (in low numbers). Although no breeding behaviour was observed, adults were recorded in suitable breeding habitat at Parteen Basin. A large cormorant colony was known to occur on the northern shoreline of Lough Derg (Department of Arts, Heritage and the Gaeltacht (DAHG) 2014c), but there was no evidence of cormorant breeding at Parteen Basin during the 2016 to 2024 survey period. Common tern is also known to breed on Lough Derg and was recorded within the study area in 2018, 2019 and 2020, however, only one individual was recorded each time and there was no evidence of breeding recorded. Goldeneye, which is also listed as a special conservation interest of the Lough Derg (Shannon) SPA occurs in winter only.

616. The wintering bird surveys carried out at Parteen Basin and Lough Derg from 2015 to 2025 (Table 2.2 and Section 2.5.1.5) recorded the following bird species which are listed as special conservation interest species of the nearby Lough Derg (Shannon) SPA: tufted duck, cormorant and goldeneye (EIAR Appendix A8.22: Winter Bird Survey Summary Report). The common tern which is also listed as a special conservation interest of the Lough Derg (Shannon) SPA occurs in summer only. Tufted duck and cormorant were both recorded in numbers considered as nationally important on a number of occasions over the survey period on Lough Derg, while only tufted duck exceeded nationally important numbers on Parteen. Hen harrier, which is a special conservation interest of the Slievefelim to Silvermines Mountains SPA, which is within the ZoI of the Proposed Project (for more details see Table 6.1), was recorded on two occasions, both involving brief hunting observations over the study area. There was no evidence of breeding or winter roost activity.

617. Other Annex I species recorded at Parteen Basin and the RWI&PS, included kingfisher, little egret, whooper swan and white-tailed eagle (EIAR Appendix A8.21: Breeding Bird Surveys Summary Report and EIAR Appendix A8.22: Winter Bird Surveys Summary Report), however, there are no European sites within the ZoI of the Proposed Project designated for these species.

4.3.1.2.1 Invasive Non-Native Species

618. A review of online records of invasive non-native flora was carried out for the 10km square grids surrounding the Proposed Project which are described in Section 4.3.7.2 and listed in Table 4.9. The RWI&PS is located within the grid square R77 where INNS listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 S.I. 477 (as amended) including Himalayan balsam (*Impatiens glandulifera*), Japanese knotweed (*Reynoutria japonica*), rhododendron (*Rhododendron ponticum*), three-cornered leek (*Allium triquetrum*) and curly waterweed (*Lagarosiphon major*), were recorded by the NBDC. No invasive non-native flora were recorded during ecological surveys.

619. The invasive non-native zebra mussel is abundant in Lough Derg and has been expanding its range in the Lough in recent years, leading to the decline of two native mussel species in the Shannon system (Minchin *et al.* 2002). In studies carried out in Parteen Basin and Lough Derg in 2016 and 2017 (Minchin 2016; and Minchin and Boelens 2017) zebra mussel were found to be well established in Parteen Basin, on stones and the shells of the native duck mussel. Small numbers of dead duck mussel were recorded in the area, but no live specimens were encountered. The nature of zebra mussel settlements suggest extensive annual recruitments will continue within this region.

620. Asian clam were recorded in both the River Shannon and Upper Lough Derg in surveys in 2011 and 2012 (Minchin 2014). However, studies carried out from Lower Lough Derg to the Parteen Basin Weir between January 2011 and July 2016 did not reveal any clams in this region (Minchin 2016).

621. During the aquatic scuba survey carried out at the RWI&PS between 2017 and 2024 (Section 2.5.1.6), the only freshwater INNS recorded was Nuttall's waterweed. Seven invasive non-native aquatic plant species have been recorded in the Shannon navigation (Minchin and Boelens 2011) and include: water fern (*Azolla filiculoides*), Canadian pondweed/waterweed (*Elodea Canadensis*), Nuttall's waterweed, water violet (*Hottonia palustris*), least duckweed (*Lemna minuta*), pink water lily cultivar (*Nymphaea alba*), and water soldier (*Stratiotes aloides*). These species are considered 'Low' to 'Medium Risk' INNS according to the Invasive Species Ireland National Invasive Species Database (NBDC 2025). During surveys conducted in August 2021 and August 2024 at Lough Derg and Parteen Basin (RWI&PS), zebra mussel, quagga mussel, charophyte starry stonewort (*Nitellopsis obtusa*) and Nuttall's waterweed were recorded (EIAR Appendix A8.19: Aquatic Invasive Species Survey Report and EIAR Appendix A8.23: Aquatic Invasive Species and Macrophyte Survey at Lough Derg and Parteen Basin). Both the zebra mussel and Nuttall's waterweed are high impact INNS. Quagga mussel is listed on the Third Schedule Part 2 of the European Communities (Birds and Natural Habitats) Regulations 2011.

4.3.2 Water Treatment Plant

4.3.2.1 Habitats

622. The habitat at the proposed WTP site is characterised as rush-dominated wet grassland (GS4). The land consisted of heavy clay soil and was poached by cattle. No surface water was visible. The Lower River Shannon SAC is the closest European site to the proposed WTP. The closest mapped water body to the WTP is the Kilmastulla_050 (SC: 25_3881) which is located approximately 540m south of the site at its closest point and is partially designated as a SAC, i.e. the Lower River Shannon SAC. As mentioned in Section 2.5.1.6, a drainage ditch (WBX004), which flows east to west along the south side of the woodland to the south of the WTP, would receive surface water from the WTP in operation, and flows into the Kilmastulla_050 approximately 195m downstream of the WTP access road (see WBX004 on EIAR Figure 8.12). The proposed access road to the WTP approaches the site from the south, connecting the site with the R445 (formerly the N7 main Limerick to Dublin Road) and crosses open farmland and forested land. The route has been positioned to avoid the boundaries of the Lower River Shannon SAC. However, the route does cross Knockadromin Stream (WCX002, a tributary of the Kilmastulla River), approximately 35m upstream of the Lower Shannon River SAC and a drainage ditch

(WBP221) approximately 150m upstream of the Lower River Shannon SAC. The Lower River Shannon SAC is the closest European site to the proposed WTP. The WTP site is not located within the boundaries of any European site, and the habitats present on-site did not correspond to any EU Annex I habitat type. The dominant species recorded included: soft rush (*Juncus effusus*), springy turf-moss (*Rhytidiadelphus squarrosus*), creeping buttercup (*Ranunculus repens*), annual meadow grass (*Poa annua*), and Yorkshire fog (*Holcus lanatus*).

4.3.2.2 Species

623. No Annex II species were recorded during field surveys between 2016 and 2024 within the study area of the WTP, with the exception of lesser horseshoe bat. Lesser horseshoe bat was only recorded once during the array of bat surveys undertaken and this was located north-west of Birdhill at a derelict building within the WTP site (EIAR Appendix A8.9: Bat Surveys Report). However, it is not within the normal commuting range associated with any European site within the ZoI of the Proposed Project.

624. The breeding and wintering bird surveys carried out between 2015 and 2025 (Table 2.2) recorded the following bird species within or in the study area of the WTP which are Annex I and/or special conservation interest species for SPAs within the ZoI: hen harrier, cormorant, and black-headed gull (Chroicocephalus ridibundus) (EIAR Appendix A8.21: Breeding Bird Surveys Summary Report and EIAR Appendix A8.22: Winter Bird Surveys Summary Report). These species are listed as special conservation interests for their breeding and/or wintering populations for the following European sites within the ZoI: Slievefelim to Silvermines Mountains SPA, Lough Derg (Shannon) SPA, River Little Brosna Callows SPA, and the River Shannon and River Fergus Estuaries SPA (for more details see Table 6.1). However, within the WTP study area these species were typically recorded in low numbers and mainly in flight over the site.

625. Other Annex I species recorded at the WTP, included, little egret, and peregrine falcon (EIAR Appendix A8.21: Breeding Bird Surveys Summary Report and EIAR Appendix A8.22: Winter Bird Surveys Summary Report), however, there are no European sites within the ZoI of the Proposed Project designated for these species.

4.3.2.2.1 Invasive Non-Native Species

626. A review of online records of invasive non-native flora was carried out for the 10km square grids surrounding the Proposed Project which are described in Section 4.3.7.2 and listed in Table 4.9. The WTP is located within the grid square R77 where INNS listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 S.I. 477 (as amended) including, Himalayan balsam, Japanese knotweed, rhododendron, three-cornered leek and curly waterweed, were recorded by the NBDC. No invasive non-native flora were recorded during ecological surveys.

4.3.3 Break Pressure Tank

4.3.3.1 Habitats

627. The proposed site for the BPT is located in an area of agricultural grassland (GA1) with occasional scrub (WS1) and is bordered by hedgerows (WL1). No Annex I habitats were recorded within the footprint of the BPT. Species recorded on-site included: perennial ryegrass (*Lolium perenne*), Yorkshire fog, chickweed (*Stellaria media*), nettle (*Urtica dioica*), meadow thistle (*Circium dissectum*) and meadow buttercup (*Ranunculus acris*). There are no surface water features or hydrological pathways to any European sites within or from the footprint of the BPT. The closest mapped water body to the BPT is the Ballyfinboy_040 (SC: 25_3690) which is located approximately 1.45km south-west of the site at its closest point and the closest European site is the Scohaboy (Sopwell) Bog SAC which is located approximately 1.8km north.

4.3.3.2 Species

628. As mentioned, the proposed BPT site is located in a field of agricultural grassland which has low biodiversity. No Annex II species were recorded during field surveys between 2016 and 2024 within the study area of the BPT. In addition, no Annex I and/or special conservation interest species for SPAs within the ZoI, were recorded during breeding and winter bird surveys between 2015 and 2025 within the study area of the BPT.

4.3.3.2.1 Invasive Non-Native Species

629. A review of online records of invasive non-native flora was carried out for the 10km square grids surrounding the Proposed Project which are described in Section 4.3.7.2 and listed in Table 4.9. The BPT is located within grid squares R98 and R99. Invasive non-native flora recorded by the NBDC listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 S.I. 477 (as amended) included giant rhubarb (*Gunnera tinctoria*), Japanese knotweed and rhododendron, However, no invasive non-native flora were recorded during ecological surveys.

4.3.4 Booster Pumping Station

4.3.4.1 Habitats

630. The proposed site for the BPS is located in an area of agricultural grassland (GA1) bordered by hedgerows (WL1). No Annex I habitats were recorded within the footprint of the BPS. Species recorded on-site included: perennial ryegrass, dock (*Rumex obtusifolius*), dandelion (*Taraxacum officinale),* nettle and Marsh thistle (*Cirsium palustre)*. The closest mapped water body to the BPS is the Camcor_030 (SC: 25_705) which is located adjacent to the BPS, along its eastern boundary. This water body is not designated as a European site. It flows into the Camcor River (which flows through Birr town) and eventually into the River Shannon Callows SAC, over 21km downstream (as the crow flies). There are no surface water features or hydrological pathways to any European sites from within the footprint of the BPS. The closest European site is the Slieve Bloom Mountains SPA which is located approximately 5km east.

4.3.4.2 Species

631. Similarly to the BPT, the proposed BPS site is located in a field of agricultural grassland which has low biodiversity. No Annex II species were recorded during field surveys between 2016 and 2025 within the study area of the BPS.

632. The following Annex I bird species were recorded at the BPS: golden plover and hen harrier (EIAR Appendix A8.21: Breeding Bird Surveys Summary Report and EIAR Appendix A8.22: Winter Bird Surveys Summary Report), however, there are no European sites within the ZoI of the Proposed Project designated for these species.

4.3.4.2.1 Invasive Non-Native Species

633. A review of online records of invasive non-native flora was carried out for the 10km square grids surrounding the Proposed Project which are described in Section 4.3.7.2 and listed in Table 4.9. The BPS is located within the grid square N10. Several invasive non-native flora were recorded by the NBDC which included those listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 S.I. 477 (as amended), giant rhubarb, Himalayan balsam, rhododendron, Spanish bluebell (*Hyacinthoides hispanica*), and Japanese knotweed. However, no invasive non-native flora were recorded during ecological surveys.

4.3.5 Flow Control Valve

4.3.5.1 Habitats

634. The proposed site for the FCV is located in improved agricultural grassland (GA1) with drainage ditches (FW4) and treelines (WL2) present. No Annex I habitats were recorded within the footprint of the FCV. The closest European site to the FCV is the Rye Water Valley/Carton SAC which is located approximately 7.2km north-east. A drainage ditch, which contained flowing water, runs parallel to the L1016 Commons Road Upper and the FCV site and likely drains to the Liffey_140. The closest mapped water body to the FCV is the Reeves_010 (SC: 09_2200) which is located approximately 632m north-west of the site at its closest point. This water body is not designated as a European site, nor is the drainage ditch or Liffey_140. It flows into the Liffey_140 approximately 240m downstream (as the crow flies). The Liffey_140 flows into the River Liffey and ultimately into Dublin Bay. In the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into any downstream European sites. Downstream European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the FCV.

4.3.5.2 Species

635. As mentioned, the proposed FCV site is located in a field of improved agricultural grassland which is considered to be of low ecological value. No Annex II species or Annex I bird species were recorded during field surveys between 2016 and 2025 within the study area of the FCV.

4.3.5.2.1 Invasive Non-Native Species

636. A review of online records of invasive non-native flora was carried out for the 10km square grids surrounding the Proposed Project which are described in Section 4.3.7.2 and listed in Table 4.9. The FCV is located within the grid square N92. Several invasive non-native flora were recorded by the NBDC which included those listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 S.I. 477 (as amended): giant hogweed (*Heracleum mantegazzianum*), Himalayan balsam, Japanese knotweed, and three-cornered leek. However, no INNS were recorded during ecological surveys.

4.3.6 Termination Point Reservoir

4.3.6.1 Habitats

637. The proposed site for the TPR is located in a field of arable crops (BC1) with amenity grassland (GA2) and hedgerows (WL1). No Annex I habitats were recorded within the footprint of the TPR. There are no surface water features or hydrological pathways to any European sites within or from the footprint of the TPR. The closest water body to the TPR is the Liffey_170 (SC: 09_1148; Lucan Stream) which is located approximately 610m north-east of the site at its closest point and the closest European site is the Rye Water Valley/Carton SAC which is located approximately 4.5km north.

4.3.6.2 Species

638. As mentioned, the proposed TPR site is located in a field of arable crops which is considered to be of low ecological value. The breeding and wintering bird surveys carried out between 2015 and 2025 (Table 2.2) recorded the following bird species within or in the study area of the TPR which are listed as Annex I and/or special conservation interest species for SPAs within the ZoI: curlew, golden plover, peregrine falcon, red kite and black-headed gull (EIAR Appendix A8.21: Breeding Bird Surveys Summary Report and EIAR Appendix A8.22: Winter Bird Surveys Summary Report). However, these species were

typically recorded sporadically and/or passed over the site. There are no European sites within the ZoI of the Proposed Project designated for curlew, golden plover, peregrine falcon, red kite or black-headed gull.

4.3.6.2.1 Invasive Non-Native Species

639. A review of online records of invasive non-native flora was carried out for the 10km square grids surrounding the Proposed Project which are described in Section 4.3.7.2 and listed in Table 4.9. The TPR is located within the grid square O03. Several invasive non-native flora were recorded by the NBDC which included those listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 S.I. 477 (as amended): American skunk-cabbage (*Lysichiton americanus*), giant hogweed, giant-rhubarb, Himalayan balsam, Japanese knotweed, rhododendron, three-cornered leek and Spanish bluebell. However, no INNS were recorded during ecological surveys.

4.3.7 Twin Raw Water Rising Mains and Treated Water Pipeline

4.3.7.1 Habitats

640. In general, the majority of the habitats within the Twin RWRMs and the Treated Water Pipeline include improved agricultural grassland and arable crops, with areas of cutover bog, pockets of forestry (natural and plantation), and smaller pockets of more natural habitats of higher ecological value such as riparian woodland, poor fen and flush or wet grassland.

641. The Proposed Project would cross numerous small streams and tributaries as well as larger rivers including: the River Blackwater (PSNWCX002), River Shannon (Lower) (PSNWCX004), Kilmastulla River (WCX002), Nenagh River (WCX016), Little Brosna River (WCX026) and the River Liffey (WCX073), before terminating at Peamount Reservoir in County Dublin (refer to Appendix J: Watercourse Crossings and Pathways to European Sites, for the full list of watercourse crossings).

642. The habitat types recorded along the Twin RWRMs and the Treated Water Pipeline, are as follows:

- BC1 Arable crops
- BC3 Tilled land
- BL1 Stone walls and other stonework
- BL2 Earthbanks
- BL3 Buildings and artificial surfaces
- BL3/GA2 Buildings and amenity grassland mosaic
- ED1 Exposed sand, gravel or till
- ED2 Spoil and bare ground
- ED3 Recolonising bare ground
- FL8 Other artificial lakes and ponds
- FW1 Eroding/upland rivers
- FW2 Depositing/lowland rivers
- FW3 Canals
- FW4 Drainage ditches
- GA1 Improved agricultural grassland
- GA1/GS4 Improved and wet grassland mosaic
- GA2 Amenity grassland (improved)
- GS1 Dry calcareous and neutral grassland
- GS2 Dry meadows and grassy verges
- GS2/ED3 Dry meadows and grassy verges/recolonising bare ground
- GS2/HD1/WS1 Dry meadows, grassy verges, dense bracken and scrub mosaic
- GS3 Dry-humid acid grassland
- GS4 Wet grassland
- GS4/WS1 Wet grassland and scrub mosaic
- HD1 Dense bracken
- HD1/WS1 Dense bracken and Scrub mosaic
- HH3 Wet heath
- PB1 Raised bog
- PB4 Cutover bog.

- PB4/FW4 Cutover bog and drainage ditches mosaic
- PB4/HH3 Cutover bog and wet heath mosaic
- PB4/WN7 Cutover bog and bog woodland mosaic
- PB4/WS1 Cutover bog and scrub mosaic
- PB4/WS1/HH1/GS2 Cutover bog, scrub, dry siliceous heath and dry meadows and grassy verges mosaic
- PF2 Poor fen and flush
- WD1 (Mixed) broadleaved woodland
- WD1/WS1 (Mixed) broadleaved woodland and scrub mosaic
- WD2 Mixed broadleaved/conifer woodland
- WD2/WS1 Mixed broadleaved/conifer woodland and scrub mosaic
- WD3 (Mixed) conifer woodland
- WD4 Conifer plantation
- WL1 Hedgerows
- WL2 Treelines
- WN2 Oak-ash-hazel woodland
- WN5 Riparian woodland
- WN6 Wet willow-alder-ash woodland
- WN7 Bog woodland
- WN7/WS1 Bog woodland and scrub mosaic
- WS1 Scrub
- WS2 Immature woodland
- WS4 Short rotation coppice

643. Habitats identified within the Proposed Project are categorised in accordance with Fossitt (2000). The recorded habitats have been mapped and are shown in Figure 8.4 to Figure 8.108 of the EIAR.

644. Known Annex I habitats, identified through the desktop study analysis, were avoided during the route selection process (EIAR Chapter 3: Consideration of Reasonable Alternatives). Detailed Botanical Surveys were carried out between 2017 and 2025 at target areas assessed as being of potential national importance or greater, areas identified as having potential for rare or protected flora, as well as at the infrastructure sites which would be subject to permanent habitat loss (based on a combination of interpretation of orthophotography and collation of available existing habitat information). During the detailed Botanical Surveys additional relevé (vegetation plot) data were collected. The results from each of these surveys are provided in:

- EIAR Appendix A8.3 (Site Description of Coagh Upper Fen, County Offaly)
- EIAR Appendix A8.4 (Target Habitat Surveys Report)
- EIAR Appendix A8.5 (Rare Plants Survey Report)

645. The information obtained during these surveys was incorporated into the route selection process, with the aim of avoiding Annex I habitats and sites of potential ecological value for the habitats present, where possible. Previously unidentified Annex I habitats, recorded during habitat surveys were avoided by re-routing previous iterations of the project. As a result, no Annex I habitats are located within the Proposed Project.

4.3.7.2 Species

646. A diverse range of habitats present across the pipeline corridor support an equally diverse species assemblage.

647. As mentioned, the habitats within the Proposed Project support populations of all nine species of bat found in Ireland. These are: common, soprano, and Nathusius Pipistrelles, Leisler's Bat, Daubenton's bat, Natterer's Bat, brown long-eared bat, lesser horseshoe bat, and whiskered bat. However, no lesser horseshoe bats (the only Annex II listed bat species) were recorded during field surveys between 2016 and 2025 along the RWRMs or the Treated Water Pipeline (EIAR Appendix A8.9: Bat Surveys Report).

648. Otter field signs (spraints, trails, couches, tracks, and slides) were recorded along the following watercourses: Figile (WCX056), Ballykilleen (WCX055), River Liffey (WCX073), Nenagh (WCX016), Breaghmore (WCX031), Camcor (WCX032), Silver (Kilcormac) (WCX036), Kilgolan Lower (WCX035), Grand Canal Main Line East (Barrow) (WBX078), Kilmastulla (WCX002 and WCX009), Knockadromin (WCX004), Clodiagh (Tullamore) River (WCX039), Rock (Birr) (WCX027), Kilmaine 25 (WCX028), Tullamore 25 (WCX045), Meelaghans (WCX042), Esker (Stream) Offaly (WCX049), Blackwater (Longwood) (WCX065), Mulgeeth (WCX061), Grand Canal Main Line (Liffey and Dublin Bay) (WBX088), Blackwater [Clare] River (PSNWCX002) and Daingean 030 (WCX048) and drainage ditches at WBX034, WBX037 and WBX068.

649. Otter field signs were generally located in the riparian zone, close to the Proposed Project watercourse crossing points, as would be expected based on the known habitat preference for this species. Within the study area (i.e. 150m), 15 otter holts were recorded, three of which were recorded within the Proposed Project and the remaining 12 within 150m. Of the three holts within the Proposed Project, recorded at Chainages TW – 700, TWA – 1300 and TWB – 24800, two were active and one was inactive. The remaining 12 holts were recorded at a distance of less than 150m from the Proposed Project (Figure 8.109 to 8.212 of the EIAR). Of these 12 holts, seven appeared to be active and five were inactive. The otter holt recorded at TW – 700 is located along the Incha Beg Stream, approximately 780m upstream of the Lower River Shannon SAC.

650. A diverse range of both breeding and wintering bird species were recorded during the surveys carried out in preparation of this AA. The surveys carried out between 2015 and 2025 (Table 2.2) recorded several bird species of conservation concern within the study area. These included Annex I species and/or special conservation interest species for SPAs within the ZoI (EIAR Appendix A8.21: Breeding Bird Surveys Summary Report and EIAR Appendix A8.22: Winter Bird Surveys Summary Report):

- Hen harrier (a special conservation interest for Slievefelim to Silvermines Mountains SPA, Slieve Aughty Mountains SPA and Slieve Bloom Mountains SPA, which are within the ZoI of the Proposed Project)
- Tufted duck, cormorant, common tern (special conservation interest species for Lough Derg (Shannon) SPA, which is within the ZoI of the Proposed Project)
- Whooper swan, golden plover, teal (*Anas crecca*), black-headed gull, lapwing (*Vanellus vanellus*), wigeon (*Anas penelope*) (special conservation interest species for River Little Brosna Callows SPA and River Shannon and River Fergus Estuaries SPA, which are within the ZoI of the Proposed Project)
- Greylag goose (*Anser anser*) and lesser black-backed gull (*Larus fuscus*) (special conservation interest species for Poulaphouca Reservoir SPA, which is within the ZoI of the Proposed Project)
- Kingfisher (*Alcedo atthis*) (a special conservation interest for River Boyne and River Blackwater SPA, which is within the ZoI of the Proposed Project)
- Peregrine and curlew were also recorded but there are no European sites within the ZoI of the Proposed Project designated for either species.

651. The majority of the watercourses crossed by the route of the pipeline (546 of 639; including watercourses along the power to line valves) are HMWB which correspond with the habitat type, ‘Drainage Ditch’ (FW4). Five hundred and thirty-two of these are not identified by the EPA, i.e. they are unknown or smaller than first-order watercourses. Of the 546 drains crossed by the route of the pipeline, 330 are within the Lower Shannon catchment, 118 are in the Barrow catchment, 28 are in the Boyne catchment, and 70 are in the Liffey catchment. These drainage ditches are generally of limited value for fish species, but it is acknowledged that this is not always the case as some drainage ditches may support protected aquatic species, and this was considered during surveys. Three-spined stickleback (*Gasterosteous aculeatus*) and minnow (*Phoxinus phoxinus*) were recorded at several of the watercourse crossings throughout the Proposed Project during the aquatic surveys between 2016 and 2025 (EIAR Appendix A8.14: Watercourse Crossing Data). Although neither are Annex II species, they may be a food source

for other Annex II species such as otter. Small drains can also occasionally be used by white-clawed crayfish. However, none were recorded in any of the drainage ditches during the aquatic surveys between 2016 and 2025.

652. The route of the RWRMs and Treated Water Pipeline would cross 29 watercourses which have been categorised as 'Eroding/upland Rivers' (FW1). Twenty of these watercourses have been identified and named by the EPA. The following species were recorded in one or more of these watercourses: stone loach (*Barbatula barbatula*), three-spined stickleback, brook lamprey (*Lampetra planeri*), brown trout (*Salmo trutta*), minnow (*Phoxinus phoxinus*), white-clawed crayfish, and lamprey sp. Of these species, lamprey and white-clawed crayfish are listed as Annex II species. Lamprey sp. are a qualifying interest for the following European sites within the ZoI of the Proposed Project: Lower River Shannon SAC, River Barrow and River Nore SAC, and River Boyne and River Blackwater SAC. There are no European sites within the ZoI of the Proposed Project designated for white-clawed crayfish.

653. The route of the RWRMs and Treated Water Pipeline would cross 60 depositing/lowland rivers (FW2). The larger of these water bodies (4th order or greater) include: Nenagh River, Little Brosna River, Silver River, Clodiagh River, Figile River and the River Liffey. During the aquatic surveys from 2016 to 2024 the following aquatic fauna were recorded in one or more FW2 water bodies; Atlantic salmon, brown trout, stickleback sp., minnow, lamprey sp., and white-clawed crayfish. Of these species, Atlantic salmon, lamprey and white-clawed crayfish are listed as Annex II species. Atlantic salmon and lamprey sp. are qualifying interests for the following European sites within the ZoI of the Proposed Project: Lower River Shannon SAC, River Barrow and River Nore SAC, and River Boyne and River Blackwater SAC.

654. The Treated Water Pipeline from the BPT to the TPR would cross the Grand Canal on two occasions; at Kilpatrick, County Kildare at Chainage TWD – 15100 (Figure 8.89 of the EIAR) and at Colganstown, County Dublin near Chainage TWE – 14200 (Figure 8.106 of the EIAR). The Grand Canal is designated as an Artificial Water Body by the WFD. There are no known records of rare or protected species at the Colganstown crossing and no protected species were recorded during the 2016 to 2024 field surveys. However, the following protected aquatic species have been recorded within the 10km square grid (N93) in which the proposed crossings lie: common frog, white-clawed crayfish, Desmoulins's whorl snail, and narrow-mouthed whorl snail (NBDC 2025). Vascular plants recorded along the water's edge and in the canal during field surveys included: arrowhead, reed sweet-grass (*Glyceria maxima*), rushes, and broadleaved pondweed (*Potamogeton natans*). At the Kilpatrick crossing there are also no known records of rare or protected species; however, opposite-leaved pondweed (*Groenlandia densa*) was recorded at the crossing during field surveys in August 2017 and October 2019. The following protected aquatic species have also been recorded within the 10km square grid (N72) in which the proposed crossings lies; common frog, white-clawed crayfish, opposite-leaved pondweed, and Desmoulins's whorl snail (NBDC 2025). Vascular plants recorded along the water's edge and in the canal during field surveys at this site included broadleaved pondweed, fool's watercress (*Apium nodiflorum*), and water-plantain (*Alisma plantago-aquatica*).

655. There are no records of Geyer's whorl snail (Vertigo geyeri), Desmoulin's whorl snail, or narrow-mouthed whorl snail, which are Annex II listed species, within or near the Proposed Project. The closest known record for narrow-mouthed whorl snail is approximately 3.7km north of the Proposed Project along the Royal Canal in Leixlip (grid square N93), County Kildare, while the closest known record for Geyer's whorl snail is approximately 850m west of the Proposed Project on the western side of Lisduff Fen SAC, County Offaly, and for Desmoulin's whorl snail is at a flush/spring also on the western side of Lisduff Fen SAC, greater than 450m from the Proposed Project (NBDC 2025).

- Geyer's whorl snail typically prefers calcareous flushes with near-constant wetness and an open habitat structure. This species can occur in other calcareous habitats or in otherwise predominantly acid habitats. Within these habitat conditions, these snails are most often found among the wet, decaying roots of sedges and among mosses

- Narrow-mouthed whorl snail is mainly coastal, however inland populations do occur in permanently moist vegetation litter. It can occur within a number of habitat types but has very specific micro-habitat requirements that limit its occurrence in most instances of the habitat types. Habitats include freshwater marsh and wet grassland
- Desmoulin's whorl snail occurs where water level is at or slightly above ground level for much of the year, with a good cover of tall sedges and grasses and is most often found in calcareous conditions. Habitats include rich fen and flush, marsh, and riparian zones (NBDC 2025).

656. No suitable habitat (near saturated water conditions in calcareous flush-fens) for Geyer's whorl snail occurs within the ZoI of the Proposed Project. There are no optimal habitats, such as marsh or fen, for narrow-mouthed or Desmoulin's whorl snail within the Proposed Project; these habitat types were avoided during the route selection. There are, however, sub-optimal, riparian, lowland wetlands and grassland habitats throughout the Proposed Project. However, none of these habitat types recorded within the Proposed Project, that may be suitable for these species, were within the ZoI of an SAC designated for these species, and therefore they would not be an SAC population.

4.3.7.2.1 Invasive Non-Native Species

657. A review of records of invasive non-native flora was carried out for the following 10km grid squares surrounding the Proposed Project (with the exception of the 38kV; see Section 4.3.8.2): R67, R77, R87, R88, R98, R99, S08, S09, N00, N10, N11, N21, N31, N41, N42, N52, N62, N72, N73, N83, N92, N93 and O03 (NBDC 2025). The list of INNS is included in Table 4.9.

Table 4.9: Records of Invasive Non-Native Flora Within the 10km Grid Squares Encompassing the Proposed Project

Grid Square	Species Group	Species Name	Record count	Title of Dataset	Designation
N00, O03	Flowering Plant	American skunk-cabbage (*Lysichiton americanus*)	1, 1	National Invasive Species Database Online Atlas of Vascular Plants 2012 Onwards	Medium Impact Invasive Species; EU Regulation No. 1143/2014; Regulation S.I. 477 (Ireland)
N00, N10, N11, O03	Flowering Plant	Black currant (*Ribes nigrum*)	4, 1, 1, 1	Species Data from the National Vegetation Database Ireland's BioBlitz	Medium Impact Invasive Species
R87, R98, N00, N10, N42, N52, N72, N73, N83, N92, N93, O03	Flowering Plant	Butterfly-bush (*Buddleja davidii*)	1, 2, 1, 1, 2, 3, 5, 1, 4, 2, 8, 9	Online Atlas of Vascular Plants 2012 Onwards Ireland's BioBlitz	Medium Impact Invasive Species
N41, O03	Flowering Plant	Canadian fleabane (*Conyza canadensis*)	1, 1	Online Atlas of Vascular Plants 2012-2020 BSBI tetrad data for Ireland	Medium Impact Invasive Species
R67, R77, R98, S09, N00, N10, N21, N31, N41, N42, N73, N83, N93, O03	Flowering Plant	Cherry laurel (*Prunus laurocerasus*)	1,6, 1, 1, 2, 2, 2, 2, 1, 2, 1, 2, 6, 12	Species Data from the National Vegetation Database Discrete Vascular Plant Surveys Online Atlas of Vascular Plants 2012 Onwards Ireland's BioBlitz	High Impact Invasive Species
R98, N92, O03	Flowering Plant	Common broomrape (*Orobanche minor*)	1, 1, 1	Online Atlas of Vascular Plants 2021-2020	Medium Impact Invasive Species
S09, N11, N62, N83, N93, O03	Conifer	Douglas fir (*Pseudotsuga menziesii*)	1, 2, 2, 1, 2, 3	Species Data from the National Vegetation Database	Medium Impact Invasive Species
S09, N00, N31	Flowering Plant	Evergreen oak (*Quercus ilex*)	1, 1, 1	Species Data from the National Vegetation Database	Medium Impact Invasive Species
N00, O03	Flowering Plant	False-acacia (*Robinia pseudoacacia*)	1, 1	Heritage Trees of Ireland Species Data from the National Vegetation Database	Medium Impact Invasive Species
N00, N92, N93, O03	Flowering Plant	Giant hogweed (*Heracleum mantegazzianum*)	1, 1, 1, 9	Species Data from the National Vegetation Database National Invasive Species Database, Online Atlas of Vascular Plants 2012 Onwards	High Impact Invasive Species; Regulation S.I. 477 (Ireland)
N00	Flowering Plant	Giant knotweed (*Fallopia sachalinensis*)	5	National Invasive Species Database	High Impact Invasive Species; Regulation S.I. 477 (Ireland)
R98, S09, N00, N10, O03	Flowering Plant	Giant-rhubarb (*Gunnera tinctoria*)	1, 1, 4, 2, 1	National Invasive Species Database River Biologists' Database (EPA) Online Atlas of Vascular Plants 2012 Onwards	High Impact Invasive Species; Regulation S.I. 477 (Ireland)

Grid Square	Species Group	Species Name	Record count	Title of Dataset	Designation
R77, N00, N10, N21, N42, N92, N93, O03	Flowering Plant	Himalayan balsam (*Impatiens glandulifera*)	2, 31, 7, 1, 2, 42, 145, 29	Online Atlas of Vascular Plants 2012 Onwards	High Impact Invasive Species; Regulation S.I. 477 (Ireland)
R67, R77, R88, N00, N31, N72, S09, O03	Flowering Plant	Himalayan honeysuckle (*Leycesteria formosa*)	2, 2, 1, 2, 1, 1, 1, 5	Online Atlas of Vascular Plants 2012 Onwards	Medium Impact Invasive Species
R67, R87, R88	Flowering Plant	Himalayan knotweed (*Persicaria wallichii*)	1, 2, 2	National Invasive Species Database Online Atlas of Vascular Plants 2012 Onwards	Medium Impact Invasive Species; Regulation S.I. 477 (Ireland)
R67, R77, R87, R88, R98, R99, S08, S09, N00, N10, N21, N31, N42, N62, N72, N73, N92, N93, O03	Flowering Plant	Japanese knotweed (*Reynoutria japonica*)	6, 7, 17, 1, 1, 2, 3, 1, 1, 1, 1, 1, 5, 2, 2, 1, 1, 4, 16, 20	National Invasive Species Database BSBI tetrad data for Ireland Species Data from the National Vegetation Database Online Atlas of Vascular Plants 2012 Onwards The Flora of County Clare	High Impact Invasive Species; Regulation S.I. 477 (Ireland)
O03	Flowering Plant	Japanese rose (*Rosa rugosa*)	2	Discrete Vascular Plant Surveys	Medium Impact Invasive Species
N00	Flowering Plant	Pampas-grass (*Cortaderia selloana*)	1	Online Atlas of Vascular Plants 2021-2020	Medium Impact Invasive Species
N00, N11	Flowering Plant	Parrot's-feather (*Myriophyllum aquaticum*)	1, 2	Online Atlas of Vascular Plants 2012-2020	High Impact Invasive Species; EU Regulation No. 1143/2014; Regulation S.I. 477 (Ireland)
N00	Flowering Plant	Pitcherplant (*Sarracenia purpurea*)	8	Discrete Vascular Plant Surveys	Medium Impact Invasive Species
R67, R77, R88, R98, R99, S09, N00, N10, N11, N21, N31, N41, N42, N52, N72, N73, N83, N93, O03	Flowering Plant	Rhododendron (*Rhododendron ponticum*)	3, 1, 3, 1, 1, 1, 1, 2, 1, 1, 1, 1, 2, 4, 2, 2, 3, 2, 2, 1	Species Data from the National Vegetation Database Ireland's BioBlitz National Invasive Species Database, Online Atlas of Vascular Plants 2012 Onwards Irish Vascular Plant Data – Paul Green	High Impact Invasive Species; Regulation S.I. 477 (Ireland)
N42, O03	Flowering Plant	Russian-vine (*Fallopia baldschuanica*)	1, 3	Irish Vascular Plant Data – Paul Green Online Atlas of Vascular Plants 2012-2020	Medium Impact Invasive Species
R87, N00, N10, N11, N31, N62, O03	Flowering Plant	Spanish bluebell (*Hyacinthoides hispanica*)	1, 2, 2, 42, 1, 1, 2	Discrete Vascular Plant Surveys Online Atlas of Vascular Plants 2012 Onwards	Regulation S.I. 477 (Ireland)

Grid Square	Species Group	Species Name	Record count	Title of Dataset	Designation
R67, R77, R87, R88, R98, R99, S09, N00, N10, N11, N21, N31, N41, N42, N52, N62, N72, N73, N83, N92, N93, O03	Flowering Plant	Sycamore (*Acer pseudoplatanus*)	9, 1, 7, 6, 5, 2, 1, 9, 16, 15, 17, 5, 11, 19, 7, 19, 2, 5, 7, 7, 17, 6, 18, 17	Discrete Vascular Plant Surveys BSBI tetrad data for Ireland, Ireland's BioBlitz River Biologists' Database (EPA) Irish Vascular Plant Data – Paul Green Online Atlas of Vascular Plants 2012 Onwards	Medium Impact Invasive Species
R77, N00, N92, N93, O03	Flowering Plant	Three-cornered leek (*Allium triquetrum*)	1, 10, 1,2, 11	Online Atlas of Vascular Plants 2012 Onwards	Medium Impact Invasive Species; Regulation S.I. 477 (Ireland)
S09, N00, N10, N31, N93, O03	Flowering Plant	Traveller's-joy (*Clematis vitalba*)	1, 4, 4, 2, 1, 1	Discrete Vascular Plant Surveys Online Atlas of Vascular Plants 2012-2020 BSBI tetrad data for Ireland Species Data from the National Vegetation Database	Medium Impact Invasive Species
N93	Flowering Plant	Tree-of-heaven (*Ailanthus altissima*)	1	Heritage Trees of Ireland	Medium Impact Invasive Species
N10	Flowering Plant	Two-spined acaena (*Acaena ovalifolia*)	1	BSBI tetrad data for Ireland	Medium Impact Invasive Species
R99, N72	Flowering Plant	Wall cotoneaster (*Cotoneaster horizontalis*)	1, 1	Discrete Vascular Plant Surveys BSBI tetrad data for Ireland Online Atlas of Vascular Plants 2012 Onwards	Medium Impact Invasive Species
N93	Flowering Plant	Wild parsnip (*Pastinaca sativa*)	2	Online Atlas of Vascular Plants 2012-2020	Medium Impact Invasive Species

658. In total, 14 INNS were recorded at 70 locations within the study area of the Proposed Project, which included: rhododendron, Japanese knotweed, montbretia (*Crocosmia* × *crocosmiiflora*), Himalayan knotweed (*Persicaria wallichii)*, butterfly bush (*Buddleja davidii*), cherry laurel (*Prunus laurocerasus)*, snowberry (*Symphoricarpos albus*), giant rhubarb*,* wall cotoneaster (*Cotoneaster horizontalis)*, common milkweed (*Asclepias syriaca)*, winter heliotrope (*Petasites pyrenaicus*), traveller's-joy (*Clematis vitalba*), giant hogweed and Himalayan balsam*.* All of these species, other than montbretia, cherry laurel, winter heliotrope, snowberry, common milkweed, wall cotoneaster, traveller's-joy and butterfly bush, are listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 S.I. 477 (as amended). However, none of the INNS were within 50m of a European site, but three are considered to have a potential hydrological pathway to the Lower River Shannon SAC: butterfly bush (near Chainage TW – 3400), Himalayan balsam (near Chainage TW – 700) and Japanese knotweed (both within and outside the Proposed Project near Chainages TW – 700, TW – 1100 and TW – 2300) and may be at risk of spreading. Thus, construction works associated with the Twin RWRMs and Treated Water Pipeline could give rise to likely significant effects on the Lower River Shannon SAC. There is also a risk of other INNS spreading within or into the Proposed Project and therefore mitigation measures will be required.

659. The Third Schedule INNS found within the study area of the Proposed Project were recorded in the following locations:

- Rhododendron was recorded on two occasions within the Proposed Project, near poleset 79B and 99B. Rhododendron was also recorded on four occasions outside but within 75m of the Proposed Project; approximately 2m from the Proposed Project near poleset 79B, 51m from the Proposed Project near poleset 99B, 27m from the Proposed Project near poleset 19B, and 23m from the Proposed Project near Chainage TWD – 27200
- Japanese knotweed was recorded on three occasions within the Proposed Project: near Chainage TW – 700, at TW – 2300, and along the R445 between Birdhill and the entrance to the WTP Access Road. Japanese knotweed was also recorded on 27 occasions within 75m of the Proposed Project. Outside of the Proposed Project, larger areas of Japanese knotweed were identified near the Kilmastulla River at Chainage TW – 700 where a 10m^2 area of Japanese knotweed was recorded. A 30m^2 area of Japanese knotweed was recorded near Chainage TW – 1100 and a 25m^2 area of Japanese knotweed was recorded between Chainages TW – 2200 and TW – 2300. A 10m^2 area of Japanese knotweed was recorded along the R445
- Himalayan knotweed was recorded outside the Proposed Project on two occasions adjacent to the Proposed Project along the R445 at Birdhill and approximately 22m from the Proposed Project near Chainage TW – 2500 and TW – 2600, where a substantial area of over 200 stands was recorded
- Giant rhubarb was recorded on one occasion approximately 14m from the RWI&PS, closest to Chainage RW – 1
- Giant hogweed was recorded on one occasion within the Proposed Project near Chainage TW – 1900 and within the wider study area of the Proposed Project on four occasions; approximately 4m from the Proposed Project near Chainage TW – 2000, approximately 14m near Chainage TW – 1700, adjacent to the Proposed Project near Chainage TW – 1900 and approximately 25m near Chainage TW – 1600
- Himalayan balsam was recorded within the Proposed Project at several locations along the banks of the River Liffey near Chainage TWE – 11100, TWE – 9700 and TWE – 9800, along the Kilmastulla River at Chainage TW – 700 and along the R494 to the RWI&PS. Himalayan balsam was recorded an additional 11 times within 75m of the Proposed Project, where on one occasion along the River Liffey a substantial area of 120m^2 was found.

4.3.8 38 kV Uprate Works

4.3.8.1 Habitats

660. The existing 38 kV line runs in a north-east direction, across predominantly agricultural grassland dissected with linear hedgerows or treelines, and some pockets of forestry including coniferous plantation and deciduous woodland. The 38 kV line runs on a looped circuit between Ardnacrusha and Birdhill. The 38 kV Uprate Works OHLs have 78 watercourse crossings including large rivers such as the River Blackwater and the River Shannon.

661. The proposed 38 kV Uprate Works is partially located within the boundaries of the Lower River Shannon SAC. Three of the existing polesets along the line are located within this SAC; polesets 67B to 69B. However, there were no Annex I habitats or qualifying interests associated with the Lower River Shannon SAC or any other European site recorded in these areas during field surveys (Table 2.4).

662. The habitat types recorded along the 38 kV Uprate Works, are as follows:

- BC1 Arable crops
- BL2 Earthbanks
- BL3 Buildings and artificial surfaces
- BL3/GA2 Buildings and Amenity grassland
- ED3 Recolonising bare ground
- ED4 Active quarries and mines
- FW1 Eroding/upland rivers
- FW2 Depositing/lowland rivers
- FW3 Canals
- FW4 Drainage ditches
- GA1 Improved agricultural grassland
- GA2 Amenity grassland (improved)
- GS1 Dry calcareous and neutral grassland
- GS2 Dry meadows and grassy verges
- GS3 Dry-humid acid grassland
- GS4 Wet grassland
- HD1 Dense bracken
- WD1 (Mixed) broadleaved woodland
- WD2 Mixed broadleaved/conifer woodland
- WD4 Conifer plantation
- WN5 Riparian woodland
- WL1 Hedgerows
- WL2 Treelines
- WS1 Scrub
- WS2 Immature woodland

663. Habitats identified within the Proposed Project are categorised in accordance with Fossitt (2000). The recorded habitats have been mapped and are shown in EIAR Figure 8.4 to Figure 8.108 No Annex I habitats were recorded within the footprint of the Proposed Project or the study area.

4.3.8.2 Species

664. The habitats along the route of the 38 kV Uprate Works support seven out of the nine bat species found in Ireland (EIAR Appendix A8.9: Bat Surveys Report):

- Common and soprano pipistrelles (*Pipistrellus pipistrellus* and *Pipistrellus pygmaeus* respectively)
- Leisler's bat (Nyctalus leisleri)
- Daubenton's bat (*Myotis daubentonii*)
- Natterer's Bat (*Myotis nattereri*)
- Brown long-eared bat (*Plecotus auritus*)
- Whiskered bat (*Myotis mystacinus*).

665. A search of the BCIreland database (BCIreland 2025) was undertaken and a lesser horseshoe bat roost is known 3.7km south of the 38 kV Uprate Works (single bat and bat droppings noted). This species is known to travel on average 2.5km from roosts (Schofield 2008) and therefore the 38 kV Uprate Works is further, as the crow flies, from this roost. Furthermore, no lesser horseshoe bats were recorded on any of the static units during the 38 kV bat surveys in 2019 and therefore is not likely to have been commuting or foraging near the static locations.

666. There were no signs of otter recorded during the targeted field surveys for the 38 kV Uprate Works.

667. There were a number of key species of conservation concern recorded during the breeding and wintering bird surveys for the 38 kV Uprate Works. These included species which are listed as special conservation interest species for Lough Derg (Shannon) SPA which is within the ZoI of the Proposed Project: tufted duck, cormorant and goldeneye. Lough Derg (Shannon) SPA, which is known to support a nationally important colony of cormorant (DAHG 2014c), is located 5.7km upstream of the proposed 38 kV Uprate Works. The Lower River Shannon, the Headrace Canal and Parteen Basin are used by species such as cormorant as a foraging and commuting corridor between Lough Derg (Shannon) SPA and the Shannon Estuary. As the maximum foraging range for cormorant is 35km (Thaxter *et al.* 2012), this special conservation interest species may be susceptible to collision with the 38 kV Uprate Works. The core foraging range for tufted duck and goldeneye is unknown, but it is assumed these species may also use the Lower River Shannon, the Headrace Canal and Parteen Basin as a foraging and commuting corridor between Lough Derg (Shannon) SPA and Shannon Estuary; therefore, they are also considered potentially susceptible to collision with the 38 kV Uprate Works. Thus, it is concluded that the 38 kV Uprate Works could give rise to likely significant effects on the Lough Derg (Shannon) SPA.

668. The route of the 38 kV Uprate Works has 78 watercourse crossings. Seventy-one of these are not identified by the EPA, i.e. they are unknown or smaller than first-order watercourses. All 78 watercourse crossings along the 38 kV Uprate Works are within the Lower Shannon catchment. Of the 78 watercourse crossings, 69 are drainage ditches (FW4), two are eroding/upland rivers (FW1), six are lowland/depositing river (FW2) (River Shannon) and one is a canal (FW3) (Headrace Canal).

669. The 38 kV Uprate Works element of the Proposed Project crosses the Headrace Canal on one occasion (PSNWBX005) downstream of Parteen Weir at the existing 38 kV Uprate Works crossing points (between poleset 64B and 65B; EIAR Figure 8.7). The Headrace Canal carries water from Parteen Weir to the Ardnacrusha Power Station and is designated as an Artificial Water Body by the WFD. It is considered to be of lower value than naturally occurring water features. Fisheries are actively managed to avoid entry into the canal and reduce unintentional fish kills. The canal does, however, provide a linear

corridor in the landscape. Although the 38 kV Uprate Works crosses this canal, there are no proposed instream works; thus, no aquatic surveys were carried out within the canal. The 38 kV Uprate Works element of the Proposed Project also crosses the Lower River Shannon on one occasion (PSNWCX004) downstream of Parteen Weir at the existing 38 kV Uprate Works crossing points (between poleset 66B and 67B, EIAR Figure 8.7). The crossing passes through the Lower River Shannon SAC. Again, due to the nature (no proposed instream works) and scale of the 38 kV Uprate Works, no aquatic surveys were carried out. The following Annex II species have been recorded within the 10km square grids (R56, R66 and R76) in which the existing and proposed 38 kV Uprate Works lie: Atlantic salmon, otter, white-clawed crayfish, and sea lamprey (*Petromyzon marinus*) (NBDC 2025). Atlantic salmon, otter, and sea lamprey are qualifying interests of the Lower River Shannon SAC, which is within the ZoI of the 38 kV Uprate Works. There is no European site designated for white-clawed crayfish within the ZoI of the 38 kV Uprate Works; however, they are considered an important food source for otter.

4.3.8.2.1 Invasive Non-Native Species

670. A review of records of invasive non-native flora was carried out for the following 10km square grids surrounding the 38 kV Uprate Works: R56, R66 and R76 (NBDC 2025). A list of INNS records is included in Table 4.10. Each of these species are considered High or Medium Impact (NBDC 2025). High Impact INNS are listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 S.I. 477 (as amended).

Table 4.10: Records of High and Medium Impact Invasive Non-Native Species Surrounding the 38 kV Uprate Works

Grid Square	Species Group	Species Name	Record count	Title of Dataset	Designation
R66	Flowering Plant	Canadian waterweed (*Elodea canadensis*)	10	River Biologists' Database (EPA)	High Impact Invasive Species;
R66	Flowering Plant	Three-cornered leek (*Allium triquetrum*)	3	Online Atlas of Vascular Plants 2012 Onwards	Medium Impact Invasive Species; Regulation S.I. 477 (Ireland)
R66	Flowering Plant	Butterfly-bush (*Buddleja davidii*)	1	Online Atlas of Vascular Plants 2012 Onwards Ireland's BioBlitz	Medium Impact Invasive Species
R56, R66, R76	Flowering Plant	Giant hogweed (*Heracleum mantegazzianum*)	6, 23, 5	Online Atlas of Vascular Plants 2012 Onwards National Invasive Species Database	High Impact Invasive Species; Regulation S.I. 477 (Ireland)
R56, R66, R76	Flowering Plant	Japanese knotweed (*Reynoutria japonica*)	11, 13, 7	National Invasive Species Database Online Atlas of Vascular Plants 2012 Onwards	High Impact Invasive Species; Regulation S.I. 477 (Ireland)
R56, R66	Flowering Plant	Himalayan balsam (*Impatiens glandulifera*)	3, 4	Online Atlas of Vascular Plants 2012 Onwards National Invasive Species Database	High Impact Invasive Species; Regulation S.I. 477 (Ireland)
R66	Flowering Plant	Nuttall's waterweed (*Elodea nuttallii*)	11	National Invasive Species Database	High Impact Invasive Species; Regulation S.I. 477 (Ireland)
R76	Flowering Plant	Giant rhubarb (*Gunnera tinctorial*)	1	River Biologists Database (EPA)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)
R56, R66, R76	Flowering Plant	Sycamore (*Acer pseudoplatanus*)	4, 8, 1	River Biologists Database (EPA)	Medium Impact Invasive Species
R56, R66, R76	Flowering Plant	Himalayan knotweed (*Persicaria waalchii*)	1, 5, 4	National Invasive Species Database Online Atlas of Vascular Plants 2012-2020	Medium Impact Invasive Species; Regulation S.I. 477 (Ireland)

Grid Square	Species Group	Species Name	Record count	Title of Dataset	Designation
R66	Flowering Plant	Himalayan honeysuckle (*Leycesteria formosa*)	1	Online Atlas of Vascular Plants 2012-2020	Medium Impact Invasive Species
R66	Flowering Plant	Traveller's-joy (*Clematis vitalba*)	2	Species data from the National Vegetation Database	Medium Impact Invasive Species
R66, R76	Flowering Plant	Rhododendron (*Rhododendron ponticum*)	4, 1	Online Atlas of Vascular Plants 2012 Onwards	High Impact Invasive Species; Regulation S.I. 477 (Ireland)
R56	Flowering Plant	American Skunk-cabbage (*Lysichiton americanus*)	1	Online Atlas of Vascular Plants 2012 Onwards	Medium Impact Invasive Species; Regulation S.I. 477 (Ireland)

671. Of the species listed above, two species were recorded within the 38 kV Uprate Works study area. Japanese knotweed and rhododendron (listed species on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 S.I. 477 (as amended)) were recorded as follows:

- Rhododendron was recorded on two occasions within the Proposed Project study area, near poleset 79B (EIAR Figure 8.7) and poleset 99B (EIAR Figure 8.9). Rhododendron was recorded on three occasions within 75m of the Proposed Project; approximately 2m from the Proposed Project near poleset 79B, 51m from the Proposed Project near poleset 99B, and 27m from the Proposed Project near poleset 19B
- Three stands of Japanese knotweed were identified at one location (11m from Proposed Project) near poleset 89B in 2021 and 2024 (EIAR Figure 8.9).

5. Potential Impacts of the Proposed Project

672. Through the evolution of the Proposed Project, elements were included in the design to address some of the potential impacts discussed below. The design progressed in tandem with environmental and ecological studies which were undertaken to both inform the baseline environmental data and inform the design to minimise impacts on the receiving environment. Therefore, the identification and avoidance of potential impacts followed an iterative process between the design and environmental teams as follows:

- Potential impacts were identified by the environmental and ecological team
- Data on the potential impact were assessed by the design team to establish design solutions to eliminate a potential impact, and the design was updated to include these advanced solutions
- The updated design was reassessed by the environmental and ecological team
- The final design has addressed identified potential direct and indirect impacts and where potential direct and indirect impacts were not designed out, mitigation measures were incorporated.

673. The design measures are presented in Section 3.5 and how these measures avoid or minimise the potential for the Proposed Project to impact on European sites is discussed further below.

674. The Proposed Project would have the potential to have the following types of impacts on the receiving ecological environment:

Direct Impacts:

- Abstraction of water from Parteen Basin
- Permanent habitat loss/fragmentation associated with the construction (site clearance and site access) of infrastructure within the defined works area for the Proposed Project
- Temporary habitat loss/fragmentation
- Permanent/temporary loss of commuting and/or foraging habitat for EU and Irish protected species (including Annex I and Annex II species for which European sites have been designated) and also non-protected flora and fauna
- Permanent/temporary loss of resting places for EU and Irish protected species and also non-protected faunal species
- Mortality risk to aquatic or terrestrial fauna species from collisions with OHLs, construction traffic or materials.

Indirect Impacts:

- Hydrological impacts associated with the proposed abstraction
- Excavation and pipe-jacking affecting the existing hydrogeological regime
- Construction works affecting groundwater quality from contaminated surface water runoff and/or accidental spillage or pollution
- Dust affecting air quality which in turn can affect the vegetation composition and structure of nearby habitats.

Direct and/or Indirect Impacts:

- Disturbance to fauna species (e.g. through noise, vibration, artificial lighting or increased human presence) resulting in the displacement of affected species from breeding/resting places or supporting habitat, potentially at key life-cycle stages
- Effects on water quality in receiving watercourses during the Construction Phase from contaminated surface water runoff and/or accidental spillage or pollution

- Alteration of surface water drainage patterns from pipeline works and access routes that may increase or decrease localised drainage to/from areas, thereby potentially affecting surface water-dependent ecosystems
- Introduction or spread of INNS.

5.1 Construction Phase

675. The Proposed Project has been designed to avoid potential Construction Phase impacts where possible. Details of this are provided in Section 3.5. A discussion of the potential Construction Phase (including Testing and Commissioning) impacts is provided below. In each case, the effects identified are prior to any further mitigation or control measures, if required.

5.1.1 Habitat Loss and Fragmentation

676. The Proposed Project would cause a direct loss or fragmentation of habitats within the receiving ecological environment by traversing or cutting through habitat areas. Across the Proposed Project this includes habitat types such as grasslands (both improved/managed for amenity of agricultural purposes and semi-natural), arable crops, scrub, woodlands, and bog. As discussed in Section 4.3, none of these habitats corresponded with Annex I habitat types.

677. As noted, the Proposed Project overlaps with one European site, namely the Lower River Shannon SAC, at the RWI&PS site at Parteen Basin, where the proposed 38 kV Uprate Works crosses the Lower River Shannon, and where the two underground cable ducts laid in the R494 from Birdhill to the entrance of the RWI&PS access road (to facilitate power supply to the RWI&PS) cross the Kilmastulla River. The proposed RWI&PS site would consist of the RWI&PS, Microfiltration Buildings, a 38 kV electrical Substation and Power Distribution Building and ancillary works, such as Raw Water Surge Vessels, Flow Meter Chamber and RWRM Swab Chamber, a Wastewater Holding Tank and site development works.

678. The RWI&PS design was selected for a number of reasons (EIAR Chapter 4: Proposed Project Description and Chapter 5: Construction & Commissioning), one of which was to minimise construction and repair and maintenance impacts in the Lower River Shannon SAC. The intake structure would however, still require the removal of some shoreline for the PWWC Intake Screens, as well as the profiling of the reservoir bed where concrete revetment mats would extend out from the intake to prevent bed scour, for stabilisation of sloping structures, and for erosion control. This would result in a temporary loss (up to 12 months) of aquatic habitat in Parteen Basin (0.6ha) during the construction of the Intake Chamber, Inlet Chambers and Raw Water Pumping Station Building substructure, up until the placing of concrete revetment mats over a reprofiled Parteen Basin bed. The concrete revetment mats will be provided with a small cover layer of granular or other native bed material, to provide a surface which can be recolonised by native fauna. It is anticipated this will take a further 12 months to recolonise. The footprint of the RWI&PS is 4ha (additional 670m for the access road), 1.48ha (0.88ha of terrestrial habitat and 0.6ha of aquatic habitat) of which is located within the boundaries of the Lower River Shannon.

679. The proposed 38 kV Uprate Works to be undertaken within the boundaries of the Lower River Shannon SAC (i.e. the only European site to be directly impacted by these works) would involve elements of fittings and crossarm and conductor replacement works on the three existing polesets within the SAC (polesets 67B to 69B), as well as the installation of a 20 kV cable using horizontal directional drilling methods across the Kilmastulla River (WCX077). The trenchless crossing of the Kilmastulla River would be approximately 20m in length. The level of the ducting would be 1.0m below the invert level of the river at the crossing point. Stockpiling of spoil material has the potential to cause short-term habitat loss should it be placed in a manner that would smother vegetation. Works areas located adjacent or close to hedgerows/treelines may disturb these habitats through inappropriate soil management or damage by heavy machinery. A maximum temporary ground disturbance or working area of 0.28ha would occur within the immediate vicinity (30m radius) of each poleset that is to be replaced within the SAC (three

existing polesets). In total this equates to 0.55ha of wet grassland (GS4) habitat, as well as buildings and artificial surfaces (BL3). All polesets sites within the Lower River Shannon SAC would be accessed from existing roads/tracks and through open fields. Therefore, no habitat clearance would be required for the proposed access tracks. Ground disturbance associated with the movement of machinery and personnel along access tracks would cause a temporary disturbance to the terrestrial habitats. Temporary habitat loss (in less than 10 consecutive days of night-time working) would however be required along the route of the 20 kV cable, either side of the watercourse crossing (i.e. at launch and reception shafts). The launch and reception shafts would be situated outside of the riparian zone, as standard practice, therefore buffer strips of natural uncleared vegetation shall be preserved between construction activity and the watercourse crossing. The habitats recorded either side of the proposed crossing consisted of buildings and artificial surfaces (BL3) and spoil and bare ground (ED2). None of the habitats recorded at the proposed crossing within the boundaries of the Lower River Shannon SAC were Annex I habitats or qualifying interests of the SAC.

680. Habitat loss has the potential for likely significant effects on the Lower River Shannon SAC through the loss of habitat supporting the qualifying interest species (e.g. otter habitat and/or breeding/resting sites) (Table 6.1). Habitat fragmentation is the process by which habitat loss divides habitat blocks into smaller more isolated patches and can affect how ecosystems function and their resilience to change; and with regard to species, can affect interaction within or between populations, population density or species richness.

681. The Proposed Project would not directly impact upon or result in habitat loss or fragmentation of any SPA site. However, there are ten SPA sites locally which have birds listed as a special conservation interest species with core foraging ranges that extend as far as the Proposed Project (Table 6.1). It is therefore considered that connectivity could exist between the Proposed Project and these European sites. The construction of the Proposed Project could result in a reduction of supporting habitat for special conservation interest species and construction activities may result in effective habitat loss through habitat degradation or disturbance/displacement, which are discussed separately in Section 5.1.2 and Section 5.1.3. Assessing the impact of temporary and permanent habitat loss within the Proposed Project on these SPA sites is achieved by quantifying the area of each supporting habitat which would be lost. The magnitude of this impact is determined based on the proportion of available habitat which would be lost relative to the availability of these habitats both on-site and within the wider surroundings which are utilised by the special conservation interest species.

5.1.2 Habitat Degradation

5.1.2.1 Habitat Degradation as a Result of Excavation and Tunnelling

682. The Proposed Project includes elements of excavation and tunnelling, both of which have the potential to cause habitat degradation impacts within the receiving ecological environment. The proposed RWI&PS, 38 kV Uprate Works and watercourse crossings are the only tunnelling/excavation elements of the Proposed Project that would lie within or have a pathway to a European site and have the potential to give rise to this type of impact.

683. As discussed in Section 3.6.3.9, the proposed 38 kV Uprate Works and power connection to the RWI&PS would take place within the Lower River Shannon SAC and would involve excavation works using a tracked excavator for the replacement of existing polesets and horizontal directional drilling methods across the Kilmastulla River for the installation of the 20 kV cable. Habitat degradation impacts associated with such excavations/tunnelling are discussed in terms of temporary ground disturbance in Section 5.1.1.

684. As mentioned, the design of the RWI&PS requires the Inlet Chambers to be constructed on the banks of Parteen Basin (Section 5.1.1). In order to create sufficient working area to construct the Intake Chamber and screening area, secant piles would be constructed in the margin of Parteen Basin to form a dry

working area to allow piling and reinforced concrete foundations to be constructed. The concrete revetment mats would be placed on the profiled bed and used for erosion control in the area immediately outside the Intake. The secant piles would be created by first drilling a series of boreholes into the ground down to the bedrock level at every second pile location and then filling the boreholes with concrete. Once the primary piles are cast an augur would cut and remove the soil between the primary piles. A steel reinforcement cage would be lowered into the secondary borehole and then it would be filled with concrete to form the secondary pile, which intersects with the primary piles to form a continuous structure. This process would be repeated around the perimeter of the structure until the secant pile wall is complete. The construction of the Intake Chamber would likely be from land, but it is also possible that this work would be facilitated from moored pontoons on Parteen Basin using working barge(s) to remove excavated material. To accommodate the intake works the local area of the bed of Parteen Basin at the Intake would be excavated to approximately 15m bgl. The use of secant piles to construct the Intake Chamber would minimise the potential effects associated with excavation in Parteen Basin. There is potential for negative effects on the water quality of Parteen Basin from the barge or pontoon (oil, chemicals and wastewater) and from the installation works (mobilisation of sediments) leading to potential habitat degradation in Parteen Basin. Furthermore, the concrete revetment mats could potentially prevent the growth of some emergent macrophytes in the immediate shoreline, altering sediment deposition locally around the location of the intake. However, the mats would be provided with a small cover layer of granular or other native bed material to provide a surface, which can be recolonised by native flora and fauna.

685. Trenchless construction would involve tunnelling (using micro-tunnelling methods) under major crossings such as canals and watercourses identified as being ecologically sensitive, so as not to disrupt the flow of water above the pipeline route. This avoids cutting and reinstating a feature or amenity by conventional open cut excavation and pipeline installation and is the preferable alternative where there is environmental justification. However, where tunnelling is required, it poses a risk of structural fracturing or collapse of rivers/streams. This could result in the loss of habitat area or indirect habitat degradation on downstream European sites due to impacts on water quality. Furthermore, during construction of the trenchless crossings, there is potential for a ‘breakout’ of bentonite drilling fluid. This is, in effect, very fine suspended solids. If a pathway exists, and in the absence of control measures or mitigation, this could enter a watercourse and result in an increased sediment load which could lead to habitat degradation. Tunnelling could also have hydrogeological effects, and these are discussed in Section 5.1.2.3. Trenchless construction would be employed at 13 major watercourse crossings and/or watercourses considered to be of high ecological value (EIAR Chapter 5: Construction & Commissioning). These are:

- Nenagh River (WCX016) (connected to Lough Derg (Shannon) SPA)
- Little Brosna River (WCX026) (connected to Sharavogue Bog SAC)
- Camcor River (WCX032) (connected to Dovegrove Callows SPA)
- Breaghmore River (WCX031) (connected to Dovegrove Callows SPA)
- Silver (Kilcormac) River (WCX036) (connected to River Shannon Callows SAC and Middle Shannon Callows SPA)
- Clodiagh (Tullamore) River (WCX039) (connected to Charleville Wood SAC)
- Figile River on two occasions (WCX056 and WCX057) (connected to River Barrow and River Nore SAC)
- Grand Canal on two occasions (WBX078 and WBX088) (connected to South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, North Dublin Bay SAC and Bull Island SPA)
- River Liffey (WCX073) (connected to the South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA)
- Kilmastulla River on two occasions (WCX001 and WCX077) (adjacent to and within the Lower River Shannon SAC, respectively).

686. The remaining watercourses that intersect the Proposed Project, would be crossed via open cut techniques, bridges or by the OHLs (EIAR Chapter 5: Construction & Commissioning). In the case of open cut techniques there are two approaches identified: fluming and over pumping. Both techniques require watercourses to be dammed resulting in potential build-up of silt behind the damming structure. During reinstatement, this silt could be released and result in a sudden increase in sediment load downstream. If uncontrolled or unmitigated, runoff or accidental spills of oils or chemicals during the pipeline installation have the potential to release pollutants into watercourses at the crossing points, negatively affecting water quality and potentially causing habitat degradation at and downstream of the crossing point. During construction, accidental spills of oils or chemicals are more likely to come from small leaks at seals of plant machinery rather than larger spills from fuel tanks or storage. As mentioned, the majority of watercourses crossed by the Proposed Project have a link to one or more European sites, many of which are greater than 5km away (Section 4.1). The watercourses crossed by trenchless techniques are upstream of 12 different European sites (as listed above). Only eight of these 12 European sites were considered to have a viable pathway for effect with the Proposed Project (i.e. South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, and North Bull Island SPA were screened out and are not considered further) (Table 6.1).

687. The Proposed Project is designed to leave buffer strips of natural uncleared vegetation, which would be preserved between construction activity and all rivers, streams and water bodies being crossed by trenchless excavation, i.e. the launch and reception shafts for pipe jacking would be situated outside of the riparian zone. Where the pipeline runs parallel to a water body, where feasible, a buffer zone width of 35m to 60m for larger river channels (>10m wide) and of 20m or greater for smaller channels (<10m wide) would be maintained.

5.1.2.2 Habitat Degradation as a Result of Hydrological Impacts

688. Types of hydrological impacts fall into two broad categories of quantitative and qualitative impacts.

689. Quantitative hydrological impacts represent changes to the natural flow regime in the aquatic system in terms of changes to the water balance, flow depth, velocities, temperature and density, leading to changes in the hydrodynamics of the aquatic system. These changes can be brought about by direct encroachment of a water body or by altering the recharge to a water body by the presence of the Proposed Project and any associated alteration to the drainage system within the catchment area. Construction activities such as temporary encroachments of watercourses for the laying of the pipeline can also give rise to changes in the local flow regime which may alter velocities and depths and potentially give rise to changes to the hydrological flow regime and changes to channel morphology (channel deposition and erosion). Qualitative hydrological impacts represent changes to the chemistry of the receiving water bodies generally arising from drainage discharges. The Proposed Project's drainage provides a potential direct pathway for contaminant from accidental spillages.

690. Construction activities pose a significant risk to watercourses, particularly contaminated surface water from construction activities entering a watercourse which can contribute to the deterioration of water quality and can physically alter the stream/river bed and bank morphology with the potential to alter erosion and deposition rates locally and downstream. Activities within or close to the watercourse channels can lead to increased turbidity through re-suspension of bed sediments and release of new sediments from earthworks. Consequently, in-stream works can potentially represent a severe disruption to aquatic ecology.

691. The contaminants that may arise from construction runoff are:

- Elevated silt/sediment loading in construction site runoff, in particular elevated levels of suspended solids, ammonia, phosphorus and dissolved organic carbon associated with peat. Elevated silt loading can lead to long-term damage to aquatic ecosystems by smothering spawning grounds and gravel beds and clogging the gills of fish. Increased silt load in a receiving watercourse stunts

aquatic plant growth, limits dissolved oxygen capacity and overall reduces the ecological quality with the most critical period associated with low flow conditions. Chemical contaminants in the watercourse can bind to silt which can lead to increased bioavailability of these contaminants

- Spillage of concrete, grout or other cement-based products. These cement-based products are highly alkaline (releasing fine highly alkaline silt) and extremely corrosive and can result in negative impacts to watercourses altering the pH, smothering the stream bed and physically damaging fish through burning and clogging of gills by the fine silt
- Accidental spillage of hydrocarbons at Construction Compounds and Pipe Storage Depots or where machines are working
- Faecal contamination arising from on-site toilets and washing facilities.

692. Any effects on the existing hydrological regime of any watercourses draining to a European site(s) would be temporary. During the Construction Phase, contaminated surface water runoff and/or an accidental spillage or pollution event into any of the watercourse crossed by the Proposed Project has the potential to have a significant negative impact on water quality. The effects of frequent and/or prolonged pollution events in a river system can be extensive and far-reaching and can have significant long-term effects. In an extreme scenario, a pollution event of sufficient magnitude could result in the mortality of aquatic species. Water quality impacts could affect freshwater aquatic species in the receiving environment and any wetland habitats downstream connected to the receiving watercourses. Thus, the potential for likely significant effects on the 14 European sites with a hydrological pathway from the Proposed Project (as listed in Section 4.1) is considered in Section 6.1.

693. During the pipeline test and commissioning sequence, hydrostatic pressure testing will be required (EIAR Appendix A5.2: Commissioning Strategy). Sources of water for hydrostatic testing were considered. The abstraction of raw water from watercourses close to the pipeline, and discharge post testing, as a worst-case scenario, is assessed herein. Raw water abstracted from nearby watercourses would be treated in a temporary mobile water treatment rig prior to use for pressure testing. Following completion of the pressure testing, the water would be discharged through the Washout Valves to local watercourses and bunds. The watercourses along the length of the pipeline were evaluated and smaller water bodies with Q95 flow of less than 100l/s were discounted for abstraction use. The rate of abstraction will be kept below that requiring an abstraction licence. Abstraction velocities would be kept below 0.15m/s, through a fine mesh not greater than 3mm aperture which will avoid any impacts on aquatic fauna. Eight water bodies were selected as sources of raw water for hydrostatic testing, as follows: Kilmastulla River, Nenagh River, Little Brosna River, Camcor River, Silver River, Clodiagh River, River Figile, and the River Liffey (see Annex B in EIAR Appendix 5.2: Commissioning Strategy). The water from these eight different water bodies would be discharged via each Washout Valve along the pipeline; a total of 187 Washout Valves discharging into 34 different WFD designated water bodies. Each of these watercourses has a pathway to downstream European sites (see Table 5.13 and Table 5.14).

694. In addition, there are a total of 51 Line Valves along the pipeline route. Two of these are located on the RWRM and the other 49 are located along the Treated Water Pipeline. The two Line Valves on the RWRM would not have Washout Valves; however, 20 of the 49 Line Valves along the Treated Water Pipeline would have Washout Valves. Washout Valves at Line Valves would only be used to discharge the sweetening flows during final filling in the Commissioning Phase and the washout design flow would vary between 2l/s and 4l/s. The water used to test the pipeline will be released via one of these 20 Line Valve Washouts. These are detailed in Annex F in EIAR Appendix A5.2 (Commissioning Strategy). The following Washout Valves have a pathway to downstream European sites:

- WO-10: 5.8km from the Lower River Shannon SAC
- WO-20: 11.7km from the Lower River Shannon SAC
- WO-33: 4.8km from the Lough Derg (Shannon) SPA
- WO-37: Discharge over agricultural land, no pathway to European site

- WO-52: 3.6km from the Sharavogue Bog SAC
- WO-61: Discharge over agricultural land, no pathway to European site
- WO-69: 7.8km from the Dovegrove Callows SPA
- WO-77: 8.8km from the Dovegrove Callows SPA
- WO-89: 16km from the River Shannon Callows SAC
- WO-100: 21.3km from the River Shannon Callows SAC
- WO-112: 5.4km from the Charleville Wood SAC
- WO-123: 6.2km from the Charleville Wood SAC
- WO-152: 14km from the River Barrow and River Nore SAC
- WO-167: 15.8km from the River Barrow and River Nore SAC
- WO-188: 14.5km from the River Barrow and River Nore SAC
- WO-198: 20.7km from the River Barrow and River Nore SAC
- WO-215: 14.5km from the River Boyne and River Blackwater SAC
- WO-229: 8.6km from the Rye Water Valley/Carton SAC
- WO-240: No pathway to any European site
- WO-250: No pathway to any European site

695. In the absence of mitigation measures, the abstraction of water for testing and commissioning and discharge post testing, could lead to habitat degradation of downstream European sites as a result of lowering of water levels, flooding, and/or degraded water quality. Thus, the potential for likely significant effects on the European sites with a hydrological pathway from the Proposed Project (as listed in Section 4.1) is considered in Section 6.1.

5.1.2.3 Habitat Degradation as a Result of Hydrogeological Impacts

696. A hydrogeological study was undertaken to inform the impact assessment for the Proposed Project. The hydrogeological study included both a desk review and field surveys/GI works. The GI works included boreholes, trial pits, geophysical surveys and hydrogeological monitoring. The full hydrogeological survey methodology used to gather hydrogeological data for the full extent of the Proposed Project (including the locations of the GI works) is provided in EIAR Chapter 10 (Soils, Geology and Hydrogeology).

697. Table 5.1 lists groundwater bodies (GWBs) that would be traversed by or potentially impacted by the Proposed Project. The locations of these GWBs relative to the Proposed Project and European sites are discussed further herein. The Proposed Project is not located within any delineated GWDTE groundwater body.

698. Groundwater Dependent Terrestrial Ecosystems are terrestrial ecosystems that depend directly or indirectly on groundwater and constitute one of five wetland types identified by the WFD (European Commission 2003).

699. The characteristics which determine the potential for hydrogeological impacts on European sites are:

- The scale of proposed work, i.e. dewatering/proposed discharges/drainage of wetlands
- The proximity to the European site
- The level of connectivity between the European site and the Proposed Project

- The sensitivity of the GWDTE to changes in water levels or quality, i.e. the water quality of the feature and the groundwater from which it receives its base flow.

700. The main sources of pressure on GWDTEs are abstraction/drainage and nutrient inputs (Kilroy *et al.* 2008).

701. The sensitivity of SACs with GWDTE receptors is related to the proximity and extent of the Proposed Project and the GWDTE sensitivity to changes in groundwater-related factors including groundwater quantity and quality. The zones of groundwater contribution to each identified potential GWDTE have been identified as areas that are likely to supply GWDTEs. Following identification of potential GWDTEs based on extensive mapping data, the hydrological and hydrogeological desktop review information was used to determine the likelihood of connectivity between the source and receptor. Note, if a GWDTE receptor is positioned upgradient and hydrogeologically/hydrologically disconnected from the Proposed Project, or within a different GWDTE groundwater contribution zone, then there is no source-pathway-receptor and therefore there would be no adverse effects on the integrity of a European site(s).

Table 5.1: Summary of Groundwater Bodies

EU_CD Code	Name of GWB	Description	Infrastructure	GWB status (2019-2024)	Risk status
IE_SH_G_009	Ardnacrusha	Karstic	38 kV Uprate Works	Good	Not at risk
IE_SH_G_157	Lough Greany	Poorly productive bedrock	38 kV Uprate Works	Good	Not at risk
IE_SH_G_257	O'Brien Bridge Gravels	Gravels	38 kV Uprate Works	Good	Not at risk
IE_SH_G_213	Slieve Phelim	Poorly productive bedrock	38 kV Uprate Works	Good	Not at risk
IE_SH_G_178	Nenagh	Poorly productive bedrock	OHL and Birdhill 38 kV Substation; RWI&PS (incl. CC0); RWRMs; WTP (incl. CC1); BPT (incl. CC3); PSD1; and Treated Water Pipeline from the WTP to the BPT	Good	Not at risk
IE_SH_G_250	Silvermines Gravels	Gravels	OHL, RWRMs, Treated Water Pipeline from the WTP to the BPT	Good	Not at risk
IE_SH_G_248	Silvermines	Poorly productive bedrock	Treated Water Pipeline, from the WTP to the BPT Construction Working Width (TW-6100)	Poor	Not at risk
IE_SH_G_147	Lismaline	Productive fissured bedrock	CC2, Treated Water Pipeline from the WTP to the BPT	Good	Not at risk
IE_SH_G_205	Shinrone	Poorly productive bedrock	PSD2; PSD3; BPS (incl. CC4); Treated Water Pipeline	Good	Not at risk
IE_SH_G_103	Geashill	Poorly productive bedrock	CC5, PSD4, PSD5, Treated Water Pipeline from the BPT to the TPR	Good	Not at risk
IE_SE_G_107	Portlaoise	Poorly productive bedrock	Treated Water Pipeline from the BPT to the TPR	Good	Not at risk
IE_SE_G_116	Rhode	Productive fissured bedrock	Treated Water Pipeline from the BPT to the TPR	Good	Not at risk
IE_SE_G_048	Cushina	Poorly productive bedrock	PSD6, Treated Water Pipeline from the BPT to the TPR	Good	Not at risk
IE_SE_G_153	Bagenalstown Upper	Karstic	Treated Water Pipeline from the BPT to the TPR	Good	Not at risk
IE_SE_G_077	Kildare	Poorly productive bedrock	CC6, FCV Treated Water Pipeline from the BPT to the TPR	Good	Not at risk
IE_EA_G_002	Trim	Productive fissured bedrock	Treated Water Pipeline from the BPT to the TPR	Good	At risk

EU_CD Code	Name of GWB	Description	Infrastructure	GWB status (2019-2024)	Risk status
IE_EA_G_008	Dublin	Poorly productive bedrock	PSD9; PSD10; Treated Water Pipeline from the BPT to the TPR; TPR (incl. CC7)	Good	Review

Note: * CC = Construction Compound; PSD = Pipe Storage Depot

5.1.2.3.1 Infrastructure Sites (RWI&PS, WTP, BPT, BPS, FCV and TPR), Pipe Storage Depots, and Construction Compounds

702. Results of the desktop study found there are no GWDTE water bodies within 1km of the infrastructure sites, Pipe Storage Depots or Construction Compounds. The Lower River Shannon SAC is the closest European site to any of the infrastructure sites, Pipe Storage Depots or Construction Compounds (0m from the RWI&PS and approximately 550m from the WTP). Based on the site walkover and borehole data, deep soils underlie the RWI&PS and WTP sites, thereby limiting potential hydrogeological links to the Lower River Shannon SAC. Following a review of the source-pathway-receptors, there would be no likely significant effects on the Lower River Shannon SAC as a result of the RWI&PS or WTP (i.e. there are no groundwater dependent habitats or species that are qualifying interests for this SAC). There are no other European sites within 1km of the infrastructure sites, Pipe Storage Depots or Construction Compounds. Scohaboy (Sopwell) Bog SAC is the only European site with a source-pathway-receptor link to the infrastructure sites, Pipe Storage Depots or Construction Compounds and is therefore considered further herein.

703. Scohaboy (Sopwell) Bog SAC occurs within a larger raised bog system, approximately 1.8km downstream of the BPT. In the context of Scohaboy Bog SAC, potential impact sources include temporary excavations, which may require dewatering or drainage, that are artificially altering groundwater level and flows. The pathway is the hydraulic connection between the Proposed Project and features downgradient. The receptors are qualifying interests associated with the SAC.

704. Scohaboy (Sopwell) Bog SAC comprises an area of raised bog that includes both areas of high bog and cutover bog overlying deep till material. The high bog has some steep marginal slopes associated with peat-cutting, drainage, and forestry. As part of restoration works, part of the afforested peatland (outside of the SAC) has been clear-felled, while areas of peat cutting have ceased since 2015. There is 72ha of raised bog (62.4ha of high bog and over 9.55ha of cutover) which occupies the central section of the northern end of Scohaboy Bog SAC. Scohaboy Bog is a midland type raised bog developed in a basin.

705. The Scohaboy (Sopwell) Bog SAC site is bounded by cutover peatland on all margins, apart from the north where a stream (Ballyfinboy_050; SC: 25_3370) flows along the northern margin. Cutover bog occurs in the south-east of the site and an area of approximately 19ha of clear-felled coniferous plantation is present on the high bog to the north of the site. When the conifer plantation in the SAC was removed, the intensive drainage system associated with it was blocked by 2014 as part of an EU funded LIFE project (European Commission 2008). Some willow/birch scrub regeneration (June 2024) is occurring in the clear-felled area. Much of the cutaway bog outside the SAC is dominated by purple moor-grass (*Molinia caerulea*), gorse (*Ulex europaeus*) and downy birch (*Betula pubescens*) scrub. The cutaway has old peat banks remaining and dominated by ling heather (*Calluna vulgaris*) with dense gorse. The Proposed Project is located upgradient of the overall peatland, however, there are no GWDTEs associated with the Scohaboy Bog SAC. No fen areas or GWDTE were identified in the SAC or in the drained margins/cutover area of the overall peatland. On this basis there is no potential for direct or indirect hydrogeological impacts as a result of the Proposed Project.

Table 5.2: Scohaboy (Sopwell) Bog Source-Pathway-Receptor

Source	Pathway	Receptor	Mitigation required
Proposed Project	No direct pathway. Degraded raised bog is not dependent on groundwater. No potential to alter groundwater levels/groundwater quality at the SAC.	Scohaboy (Sopwell) Bog SAC – Degraded raised bogs still capable of natural regeneration [7120]	No

706. Based on a review of the source-pathway-receptors, there would be no likely significant effects on any European site as a result of the RWI&PS, WTP, BPT, BPS, FCV, TPR, Pipe Storage Depots, or Construction Compounds.

5.1.2.3.2 Raw Water Rising Main, Treated Water Pipeline from the WTP to the BPT, and Treated Water Pipeline from the BPT to the TPR

707. Construction Phase activities along the RWRM and Treated Water Pipeline have the potential to interact with the hydrogeology of receptors by changing the groundwater regime upon which the receptor is dependent. The potential direct or indirect impacts of the pipeline on the existing hydrogeological regime are discussed in this section.

708. Nine SACs and four SPAs are located downgradient of, or are within the GWDTE zone of contribution and hydrogeological ZoI and/or are within 200m upgradient of the Proposed Project (Lower River Shannon SAC, Lisduff Fen SAC, Sharavogue Bog SAC, River Barrow and River Nore SAC, Lough Derg, North-east Shore SAC, Rye Water Valley/Carton SAC, Charleville Wood SAC, River Boyne and River Blackwater SAC, River Shannon Callows SAC, Lough Derg (Shannon) SPA, Dovegrove Callows SPA, River Boyne and River Blackwater SPA, and Middle Shannon Callows SPA), as detailed in Table 6.1. With the exception of Lisduff Fen SAC, no GWDTE associated with European sites are located within 1km of the RWRM or the Treated Water Pipeline. As noted, the assessment follows a source-pathway-receptor approach, by which for there to be a risk of impact to surface water or groundwater, a source, pathway, and receptor all have to be present to create a pollutant linkage or create a linkage based on natural processes. In the context of Lisduff Fen SAC, impact sources include temporary excavations, which may require dewatering or drainage, that are artificially altering groundwater level and flows. The pathway is the hydraulic connection between the Proposed Project and features downgradient. The receptors are groundwater dependent features associated with the Lisduff Fen SAC.

709. Lisduff Fen is the nearest SAC with groundwater dependent qualifying interests (approximately 490m downstream of the Proposed Project). The main part of Lisduff Fen SAC (western section of the SAC) comprises a wet calcareous fen, with typical fen and marsh species such as black bog-rush (*Schoenus nigricans*), common reed (*Phragmites australis*), few-flowered spike-rush (*Eleocharis quinqueflora*) and grass-of-parnassus (*Parnassia palustris*). Included as part of the fen system are areas of wet grassland, some birch (*Betula* sp.) and willow (*Salix* sp.) scrub, and some vegetation more akin to that of raised bog, with species such as heather and bog-myrtle (*Myrica gale*). Some drainage of the fen wetland area has occurred near the Rock (Birr)_020 (SC: 25_13119) stream and to the north of the site. There is a small stand of Scots pine (*Pinus sylvestris*) at the eastern margin of the site. The alkaline fen area is located to the west of the Rock (Birr)_020 (SC: 25_13119).

710. Geyer's whorl snail (a qualifying interest for Lisduff Fen SAC) was recorded by NPWS in the fen area on a number of occasions (to the west of the river). Geyer's whorl snail is a species associated with calcareous fens, where it occurs at the base of small sedges (*Carex* spp.) and black bog-rush, where these are growing at the water edge. The sites are often in open, tufa-forming calcareous spring flushes with a stable water table and of mesotrophic type. A survey in 1995 by NPWS confirmed the presence of the species at Lisduff Fen. As stated in the conservation objectives document for the SAC (NPWS 2019d), '*The majority of records of Geyer's whorl snail (Vertigo geyeri) in Lisduff Fen SAC come from the 1km grid square N0800 (see site code VgCAM20 in Moorkens and Killeen, 2011 and in Long and*

Brophy, in prep.). There is a 1990 record from S0899, but the habitat in this section even at that time was marginal and the species has not been reported from there since. Map 3 of the conservation objectives document shows both N0800 and S0899. The species was not recorded within the known site (VgCAM20) in the SAC during a 2016 survey, but the reasons for this are unclear (Long and Brophy, in prep.)'.

711. Petrifying springs and calcareous spring mires are protected under the Habitats Directive. In European and national legislation, petrifying springs and associated tufa cascades, small streams and flushes (7220) are treated as separate entities from alkaline fens and calcareous spring mires (7230), each with their own protection measures. There is no evidence of paludal or cascade tufa deposits along the Rock (Birr)_020 (SC: 25_13119) that would provide possible microhabitats. The stream itself appears to have undergone some channelisation in recent years with a number of cattle access points and abstractions from the stream adjacent to the local roads.

712. A petrifying spring is located in the western fen area at the toeslope of a large limestone ridge. The entire Geyer's whorl snail habitat at Lisduff Fen is enclosed along the spring line on the western margin of the southern part of the site (Brophy and Long 2019). As the underlying geology comprises poorly productive limestones, the only groundwater source area from this spring is to the west of the spring. The area to the east of Rock (Birr)_020 (SC: 25_13119), where the Treated Water Pipeline from the BPT to the TPR is located, does not provide groundwater flow to the fen area and therefore, there is no potential for impact on the petrifying spring. Areas to the east of Rock (Birr)_020 (SC: 25_13119) are extensively drained and do not provide the consistently high groundwater level or wetness required by Geyer's whorl snail. There are no areas of sub-optimal or optimal habitat for Geyer's whorl snail to the east of the Rock (Birr)_020 and thus, there is no potential for impact on this qualifying interest species.

Table 5.3: Lisduff Fen Source-Pathway-Receptor

Source	Pathway	Receptor	Mitigation Required
Proposed Project	No direct or indirect pathway. No potential to alter groundwater levels/groundwater quality at the SAC.	Lisduff Fen SAC – Petrifying springs with tufa formation (*Cratoneurion*) [7220], and *Vertigo geyeri* (Geyer's Whorl Snail) [1013]. There is a petrifying spring is located to the west of the fen.	No
	No direct or indirect pathway. No potential to alter groundwater levels/groundwater quality in the SAC. Indirect temporary pathway in terms of construction stage dewatering/discharges to the Rock (Birr)_020 area cannot be ruled out.	Lisduff Fen SAC – Alkaline fens [7230]. Alkaline fen has not been mapped in detail for Lisduff Fen SAC and thus the total current area of the qualifying habitat in the SAC is unknown. Alkaline fen is mainly along the western spring line and grades into bog and scrub habitats to the east and north. The majority of the SAC comprises wet alkaline fen. The fen vegetation grades into vegetation more typical of raised bog in the north central section, and scrub woodland occurs in the north-east area of the SAC.	Yes

713. As mentioned, the Proposed Project is located approximately 490m from Lisduff Fen SAC boundary, which is the nearest SAC to the Proposed Project, with the exception of the Lower River Shannon SAC at the RWI&PS site. Given the Lisduff Fen SAC site location and its qualifying interests, the Proposed Project would not cause potential dewatering that could impact on the qualifying interest habitats (fen and petrifying spring) which are located on the opposite side of the (western boundary) SAC over 800m away. In summary, the only potential for hydrogeological impacts on the qualifying interests of the Lisduff Fen SAC arises from a potential indirect temporary pathway during the Construction Phase dewatering/discharges to the Rock (Birr)_020 area.

714. Sharavogue Bog SAC is situated between the Little Brosna_040 (SC: 25_13147) and an elevated ridge of Carboniferous limestone, approximately 3.2km from the Proposed Project. Its qualifying interests are raised bog (active), degraded raised bog, and *rhynchosporion* vegetation. It includes uncut raised bog surrounding areas which include cutover bog, wet grassland, semi-natural woodland, and an area of wet lagg vegetation in the cutover along the eastern margin of the bog and railway. The eastern edge is

bounded by a disused railway embankment, and the western edge by the Little Brosna_040 (SC: 25_13147). The entire eastern side (mostly cutover) at the base of the ridge is a zone of naturally up-welling groundwater. The inner part of the lagg receives peaty water from the bog that may have been in contact with mineral substrates beneath the bog. The outer lagg receives water runoff from the mineral soil beyond the bog. Sharavogue Bog is underlain by low permeability limestone and limestone till and alluvial deposits. The Proposed Project and Sharavogue Bog are located in separate WFD River Sub Basins, Little Brosna_030 and Little Brosna_040 respectively, therefore it can be stated that there is no potential for direct or indirect hydrogeological impacts. A number of gaining streams/drainage ditches (i.e. fed by groundwater baseflow) are located between the Proposed Project and the SAC, located in interdrumlin hollows; surface water (hydrological) impacts associated with construction activities are considered in Section 5.1.2.2.

715. Due to the relatively low permeability limestones and generally short flowpaths, in the order of 30m to 300m in the Shinrone GWB, groundwater discharges to streams and rivers that traverse the aquifer. Elevated electrical conductivity values (650µS/cm), also indicate groundwater discharge to the streams. The gaining streams form a hydrological boundary between the Proposed Project and the raised bog areas and therefore there is no potential direct groundwater pathway with the Sharavogue Bog SAC.

Table 5.4: Sharavogue Bog Source-Pathway-Receptor

Source	Pathway	Receptor	Mitigation Required
Proposed Project	No direct pathway. Qualifying interests at Sharavogue Bog are not directly dependent on groundwater. No potential to alter groundwater levels/groundwater quality at the SAC. However, potential impacts from surface waters as a result of construction activities exist. The Treated Water Pipeline is located in the surface water catchment of the Little Brosna Stream which borders the west of the SAC.	Sharavogue Bog SAC – Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150]	Yes

716. The majority of the pipeline is underlain by poorly productive aquifers. The Nenagh GWB, Silvermines Gravels GWB, Lismaline GWB, Geashill GWB and Shinrone GWB contribute groundwater to rivers that discharge to the Lower River Shannon SAC, hence there is potential for indirect impacts on the Lower River Shannon SAC.

717. With the exception of the Lower River Shannon SAC, Lisduff Fen SAC and Sharavogue Bog SAC, none of the remaining European sites within the ZoI have a source-pathway-receptor with the Proposed Project and therefore there is no potential for likely significant effects.

5.1.2.3.2.1 Groundwater Levels

718. The Proposed Project has the potential to cause an impact on groundwater levels in the receiving environment as it would require the short-term localised lowering of the groundwater levels by dewatering of the soils and bedrock during the Construction Phase. Water levels would return to pre-construction levels once the pipeline is installed and ground reinstated. There is no predicted reduction in recharge rates following the reinstatement of ground.

719. The Proposed Project is located approximately 490m east of Lisduff Fen SAC. Lisduff Fen SAC comprises a wet calcareous fen, areas of wet grassland, some birch (*Betula* sp.) and willow (*Salix* sp.), scrub, and some vegetation to the north of the SAC, more akin to that of a raised bog. On the western side, the fen merges into wet grassland which has been improved to varying degrees for pasture. A spring line is present between the fen and grassland to the west of the SAC. A fast-flowing stream which flows along the eastern boundary of the SAC, and the fen at the south end, are heavily encrusted with calcium carbonate or ‘tufa ‘deposits (Site Synopsis, Lisduff Fen SAC). In relation to the tufa deposits, deposits in the stream coincide with areas of water agitation, i.e. changes in stream elevation – small

rapids or waterfalls. No tufa was encountered within 200m of the proposed river crossing point. The stream forms a hydrological/hydrogeological boundary to the east of the SAC and based on the water chemistry and site observation, the stream is fed by surface water runoff and groundwater baseflow.

720. Groundwater and surface water from the fen area discharges to the stream further to the north of the SAC; however, drainage of the SAC appears to have altered the central section of the SAC. The eastern stream forms part of the Lisduff Fen SAC; therefore, likely significant effects on this SAC could not be screened out and are further assessed herein.

721. Given the long distance to the remaining SACs (>1km) within the ZoI of the Proposed Project (Table 6.1), and the short-term Construction Phase there are no likely significant effects from alterations in groundwater levels. Similarly, during the Operational Phase there are no likely significant effects from alterations in groundwater levels on any European site.

5.1.2.3.2.2 Groundwater Quality

722. During the Construction Phase there is a risk of groundwater pollution from accidental (small scale/localised and infrequent/rare) spillages on-site as well as from fines being transported during storm events and recharging to ground. The overburden along the pipeline consists primarily of till and gravels derived from limestones. Any such impacts would not result in any significant effect on groundwater pH as similar backfill would be used in these areas to ensure the pH, conductivity, and hardness are similar to the local or background water quality.

723. All infrastructure and the proposed pipeline will be designed to be watertight. The pipeline will be designed and constructed to minimise the possibility of any leaks. However, the potential for leakage to alter the concentrations of the parameters used to determine groundwater quality was assessed. The water quality in the proposed water supply will be compliant with the Groundwater and Drinking water regulations. During testing and commissioning any discharges will be controlled and passed through dechlorination equipment. If there is a leak on the pipeline this would not be a catastrophic failure as the chosen pipe material is steel where characteristic ‘failure’ of the pipe is a pinhole which would not lead to significant losses of water. Monitoring equipment on the pipeline would be able to detect these ‘losses’, enabling Operations personnel to react rapidly. Therefore, there would be no potential for impact on groundwater quality during the Construction Phase, and thus no adverse effect on the integrity of a European site(s).

5.1.2.3.3 38 kV Uprate Works

724. No GWDTE habitats or species that are qualifying interests for any European site within the ZoI of the Proposed Project were identified within the lands upon which existing and new polesets are proposed or will be replaced with an underground cable. Additionally, the 38 kV Uprate Works would not include any instream or bankside works. Therefore, there is no potential for significant interference with groundwater supply or quality and as such no potential for impacts on groundwater dependent habitats/species.

5.1.2.4 Habitat Degradation as a result of Air Quality Impacts

725. Emissions from construction vehicles and machinery, and the deposition of particulate matter (PM) and heavy metals produced by engine, brake and tyre wear can contribute to increased deposition of pollutants such as oxides of nitrogen (NO_X, NO_3), volatile organic compounds (VOCs), PM, heavy metals, and ammonia (NH_3) within the ZoI of the Proposed Project. This can affect the ecosystems and vegetation present, influencing plant growth rates and species composition, diversity and abundance. Dust emissions associated with construction works could, in extreme circumstances, affect adjoining habitats (potentially burying sensitive habitat or plant species). In relation to dust effects on biodiversity, the ZoI was limited to sensitive ecological habitats that are within 50m of the Proposed Project, in line with the IAQM (2024) guidelines. One SAC is located within the ZoI of the Proposed Project with respect

to dust emissions: Lower River Shannon SAC. The ZoI with respect to impacts from air quality emissions from vehicles and heavy-duty vehicle movements was limited to sensitive receptors and relevant sensitive ecological habitats within 200m from road links (TII 2022). Two European sites, the River Barrow and River Nore SAC at Mountmellick and Portarlington, County Laois and the Lower River Shannon SAC at Birdhill in County Tipperary are within the ZoI.

726. Air quality modelling of traffic emissions (nitrogen oxides (NOx), ammonia (NH_3), nutrient nitrogen (N) deposition which is nitrogen dioxide (NO_2) + NH_3 and acidity) due to the increased volume of traffic on Haul Roads from the Construction Phase of the Proposed Project was carried out as per TII (2022) which outlines the identification of sensitive receptors (e.g., designated sites) within 200m of the carriageway. The modelling outputs consisted of calculated concentrations of key pollutants at representative sensitive receptors which have the potential to be affected by the Proposed Project (e.g. designated sites within 200m of road links). This modelling focused on roads where there is greater than a 1,000 Annual Average Daily Traffic (AADT) change or greater than 200 Heavy Goods Vehicles AADT change. From this it was concluded that two European sites, the River Barrow and River Nore SAC at Mountmellick and Portarlington, County Laois and the Lower River Shannon SAC at Birdhill in County Tipperary, required modelling of traffic emissions. The worst-case modelling results predict NH_3, nitrogen deposition, and acid deposition would be in exceedance of critical loads (i.e. a quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge (CIEEM 2021) during the Peak Construction Year of 2030 for both the Do-Nothing and Do-Something scenarios, i.e. the background concentrations of these pollutants are already in exceedance of the critical loads. The concentration of pollutants was found to decrease with increasing distance from the SAC.

727. The River Barrow and River Nore SAC is designated for ten Annex I habitats. From the assessment of the site conservation objectives document (NPWS 2025c) and available Article 17 NPWS data (NPWS 2019a, 2019b and 2019c), there is only the potential for three out of the ten habitats to be present at the Proposed Project Haul Road crossings and/or within 200m of same (i.e., watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260], hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] and the priority habitat petrifying springs with tufa formation [*Cratoneurion*] [7220]).

728. Habitats surveys were therefore undertaken at Mountmellick (ITM coordinates: E 645448, N 707409) and at Portarlington (ITM coordinates: E 654212, N 712894) where the Proposed Project Haul Road crosses the River Barrow and River Nore SAC, to establish the presence or absence of the above-mentioned qualifying interest habitats. Habitats within the SAC and within a 200m radius of the Proposed Project Haul Road crossing at the Mountmellick site included a depositing/lowland river, scrub, amenity and improved agricultural grassland and buildings and artificial surfaces. No qualifying interest habitats were identified as present. Similarly, habitats within a 200m radius of the Proposed Project Haul Road crossing at the Portarlington site included a depositing/lowland river, scrub, treelines, amenity grassland, mixed broadleaved/conifer woodland, improved agricultural grassland and buildings and artificial surfaces. No qualifying interest habitats were recorded.

- The total annual mean NOx concentration (including existing emissions plus additional emissions from haul roads of the Proposed Project) at the closest point (i.e., 0m) to the River Barrow and River Nore SAC was modelled as 10.56µg/m^3 at Mountmellick and 10.6µg/m^3 at Portarlington. The NOx limit value is 30µg/m^3, which is based on S.I. No. 739 of 2022 Ambient Air Quality Standards Regulations 2022 (hereafter referred to as the Air Quality Regulations), which incorporate the ambient air quality limits for a range of air pollutants set out in Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008. Considering the low predicted concentrations, coupled with the absence of qualifying interest habitats present within 200m of the two Proposed Project Haul Road crossings, there is no potential for significant effects from NOx on any European sites as a result of the Proposed Project

- The total annual mean NH_3 concentration (including background emissions plus additional emissions associated with the Proposed Project traffic) at 0m from the River Barrow and River Nore SAC was calculated as 3.94µg/m^3 at Mountmellick and 3.92µg/m^3 at Portarlington (with a critical load of 1µg/m^3 for NH_3). However, the high concentrations are primarily due to the high background concentrations which are already in exceedance of 1µg/m^3. The Proposed Project will increase NH_3 concentrations within the relevant section of the River Barrow and River Nore SAC at Mountmellick by 0.14µg/m^3 and at Portarlington by 0.14µg/m^3. Furthermore, considering no qualifying interest habitats were recorded within a 200m radius of either Proposed Project Haul Road crossings, there is no potential for significant effects from NH_3 levels on any European sites as a result of the Proposed Project
- The total annual mean N deposition (including background emissions plus additional emissions associated with the Proposed Project traffic) at 0m from the River Barrow and River Nore SAC was calculated as 13.73kgN/ha/yr at Mountmellick and 13.8kgN/ha/yr at Portarlington. Critical loads of nitrogen are difficult to ascertain as quantitative relationships between biology and nitrogen concentrations are poorly understood, however, nitrogen inputs from catchment land-use are considered to be far greater than that of atmospheric inputs (APIS 2025b). It is important to note that freshwater habitats are typically phosphorous limited, therefore the control of phosphorous inputs is more critical than that of nitrogen in order to preserve habitat health and diversity (CIEEM 2021). Considering the absence of qualifying interest habitats present within 200m of the two Proposed Project Haul Road crossings, there is no potential for likely significant effects from N deposition levels on any European site as a result of the Proposed Project
- The total annual mean acid deposition (including background emissions plus additional emissions associated with the Proposed Project traffic) at 0m from the River Barrow and River Nore SAC was calculated as 1.0 kiliequivalent (keq)/ha/yr at Mountmellick and 0.93kgN/ha/yr at Portarlington. The critical load range of acidity for watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation and hydrophilous tall herb fringe communities of plains and of the montane to alpine levels is 0.714keq/ha/yr to 6.13keq/ha/yr (APIS 2025a). Petrifying springs with tufa formation are not sensitive to acidity. Therefore, there is no potential for significant effects from acidity levels on the aforementioned habitats. Furthermore, considering the absence of qualifying interest habitats present within 200m of the two Proposed Project Haul Road crossings, there is no potential for likely significant effects from acid deposition levels on any European site as a result of the Proposed Project.

729. The Lower River Shannon SAC is designated for 14 Annex I habitats. From an assessment of the site conservation objectives document (NPWS 2012a) and available Article 17 NPWS data, there is only potential for one out of the 14 habitats to be present at the Proposed Project Haul Road crossings and/or within 200m of same (i.e. *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410]).

- Habitats surveys were therefore undertaken at Birdhill (ITM coordinates: E 572562, N 669779) where the Proposed Project Haul Road is adjacent to the Lower River Shannon SAC, to establish the presence or absence of the above-mentioned qualifying interest habitat. Habitats within the SAC and within a 200m radius of the Proposed Project Haul Road at the Birdhill site included a depositing/lowland river, scrub, dry meadows and grassy verges, amenity and improved agricultural grassland and buildings and artificial surfaces. No qualifying interest habitats were identified as present
- The total annual mean NOx concentration (including background emissions plus additional emissions associated with the Proposed Project traffic) at the closest point (i.e. 0m) to the Lower River Shannon SAC at Birdhill was modelled as 4.4µg/m^3. As noted, the NOx limit value is 30µg/m^3. Considering the low predicted concentrations, coupled with the absence of qualifying interest habitats present within 200m of the Proposed Project Haul Road crossing, there is no potential for likely significant effects from NOx levels

- The total annual mean NH_3 concentration (including background emissions plus additional emissions associated with the Proposed Project traffic) at 0m from the Lower River Shannon SAC at Birdhill was calculated as 2.55µg/m^3, which is above the critical load of 1µg/m^3. However, the high concentrations are primarily due to the high background concentrations which are already in exceedance of 1µg/m^3. The Proposed Project will increase NH_3 concentrations within the relevant section of the Lower River Shannon SAC at Birdhill by 0.07µg/m^3. Furthermore, considering no qualifying interest habitats were recorded within a 200m radius of the Proposed Project Haul Road crossing, there is no potential for impacts from NH3 levels, and therefore no likely significant effects
- The total annual mean N deposition (including background emissions plus additional emissions associated with the Proposed Project traffic) at 0m from the Lower River Shannon SAC at Birdhill was calculated as 8.16kgN/ha/yr. As noted, critical loads of nitrogen are difficult to ascertain as quantitative relationships between biology and nitrogen concentrations are poorly understood, however nitrogen inputs from catchment land-use are considered to be far greater than that of atmospheric inputs (APIS 2025). It is important to note that freshwater habitats are typically phosphorous limited, therefore the control of phosphorous inputs is more critical to that of nitrogen in order to preserve habitat health and diversity (CIEEM 2021). Considering the absence of qualifying interest habitats present within 200m of the Proposed Project Haul Road crossings, there is no potential for likely significant effects from N deposition levels
- The total annual mean acid deposition (including background emissions plus additional emissions associated with the Proposed Project traffic) at 0m from the Lower River Shannon SAC at Birdhill was calculated as 0.57keq/ha/yr. Considering no qualifying interest habitats were recorded within a 200m radius of the Proposed Project Haul Road crossing, there is no potential for impacts from acid deposition, and therefore no likely significant effects.

5.1.2.5 Habitat Degradation as a result of Introducing or Spreading Invasive Non-Native Species

730. Invasive non-native species have been recorded within or in close proximity to the Proposed Project (Section 4.3). Therefore, construction works would have the potential to accidently cause their introduction/spread to European sites within, immediately adjacent to, or downstream of the Proposed Project. This would have the potential to have long-term effects on species composition, diversity and abundance in affected areas.

731. In addition, the discharge of water to local watercourses from Washout Valves during drain-down events following the completion of hydrostatic pressure testing during commissioning (see Section 3.7.4.3) also would have the potential to spread INNS. Without appropriate mitigation measures in place, this could have likely significant effects on downstream European sites (Table 6.1).

732. Given the presence of non-native flora and fauna species within the Proposed Project (e.g. zebra mussel and Asian clam in the Lower River Shannon SAC), in the absence of control measures and mitigation, there is potential that these species would spread or colonise areas within or outside the Proposed Project, during and post-construction. As such, there is also a risk that repair and maintenance works may inadvertently spread INNS.

733. As noted in Section 3.4.3, Haul Roads have been designated for the movement of construction materials, plant and labour to, from and between the six infrastructure sites, the pipeline, and temporary works areas. Considering no works to the Haul Roads (e.g. improvement measures) are required in advance of the Proposed Project construction works, the main source of potential impacts on European sites as a result of the Haul Roads is from construction traffic travelling along them. Potential impacts associated with the Haul Roads are considered separately to the potential impacts associated with the Proposed Project.

734. European sites within, immediately adjacent to, or downstream of the proposed Haul Roads have been considered with regard to potential for likely significant effects. Nine SACs and six SPAs are crossed by the proposed Haul Roads. These are as follows:

- River Shannon Callows SAC
- Lough Ree SAC
- Charleville Wood SAC
- Clonaslee Eskers and Derry Bog SAC
- River Barrow and River Nore SAC
- Lower River Shannon SAC
- Crosswood Bog SAC
- Lough Derg, North-east Shore SAC
- Ballynafagh Lake SAC
- Lough Ree SPA
- Middle Shannon Callows SPA
- River Suck Callows SPA
- River Nore SPA
- River Shannon and River Fergus Estuaries SPA
- Lough Derg (Shannon) SPA.

735. All proposed Haul Roads traverse through European sites along existing roads only, i.e. the Haul Roads do not deviate away from existing roads until they reach an access or egress point along the Construction Working Width. The habitats crossed by the Haul Roads are all built land (BL3) and do not correspond with qualifying interest habitats; therefore, there would be no direct impacts associated with the movement of construction traffic along Haul Roads to and from the Proposed Project, on qualifying interest habitats within any European site.

736. Potential risks associated with indirectly introducing or spreading INNS (e.g. seed dispersal) to European sites via contaminated soil/material on construction traffic coming from the Proposed Project or off site, has been considered. The spread or introduction of INNS as a result of construction traffic leaving the Proposed Project and travelling away from site along the proposed Haul Roads will be avoided by the inclusion of standard best practice features (i.e. vehicular wheel wash down facilities adjacent to site entrances/exits) within the Proposed Project. Thus, it has been determined there is no potential that construction traffic movement along the Haul Roads to and from the Proposed Project would introduce/spread INNS to European site and there would be no likely significant effects. Furthermore:

- The movement of construction traffic on Haul Roads would be similar to the existing everyday activity that occurs along these roads (i.e. the traffic assessment shows there would be an imperceptible effect on journey times or other consequences for road users as a result of the Proposed Project (EIAR Chapter 7: Traffic & Transport))
- INNS management along roadsides is already part of the operational maintenance of the National Roads Network which includes each of the proposed Haul Roads.

5.1.3 Disturbance/Displacement

737. In conjunction with any displacement effects associated with habitat loss, increased human presence and/or noise and vibration associated with construction works, has the potential to displace any fauna species from both breeding/resting places and from foraging habitat. This section discusses those species that are relevant to the assessment of effects on European sites.

738. Disturbance/displacement effects from the Proposed Project may affect the qualifying interest species of a SAC site that is crossed by, in close proximity to, or downstream of the site. The same applies in relation to SPA sites with the additional requirement to consider ex-situ sites beyond the SPA boundary, that are important in supporting the SPA's special conservation interest population(s) (i.e. areas of habitat situated within the immediate hinterland of the SPA, or in areas ecologically connected to it; Annex I and migratory species occur outside of designated sites and the protection afforded to these species is not limited to SPA sites).

5.1.3.1 Infrastructure Sites (RWI&PS, WTP, BPT, BPS, FCV and TPR)

739. With regard to the infrastructure sites, with the exception of the RWI&PS located within the Lower River Shannon SAC, none of the sites are located within or adjacent to any European site, nor do they have a hydrological pathway to any European site. Therefore, they would not result in any disturbance/displacement effects. The Lower River Shannon SAC and its qualifying interest species (otter, Atlantic salmon, sea lamprey, brook lamprey, and river lamprey) is likely to be subject to some level of direct disturbance during the Construction Phase. Freshwater pearl mussel and common bottlenose dolphin (*Tursiops truncatus*) are also qualifying interest species of the Lower River Shannon SAC; however, given the location of these qualifying interests in relation to the Proposed Project, potential pathways of risk are not considered to exist. Freshwater pearl mussel are located upstream of the Proposed Project and are therefore beyond the ZoI for effects. Bottlenose dolphin is a marine species and can be found in the Lower River Shannon SAC over 30km downstream of the Proposed Project. A surface water pathway exists; however, the Old River Shannon is tidal at its confluence with the Tailrace, therefore the confluence forms the lower limit of the hydrological ZoI on the Tailrace and the Old River Shannon. As a result, bottlenose dolphin do not occur within the ZoI and would not be affected by the Proposed Project.

5.1.3.1.1 Otter

740. As there were no otter breeding or resting places, holts or couches, within the boundaries of the RWI&PS footprint, the Proposed Project would not result in any direct disturbance or displacement effects in that regard. However, otter presence was recorded along the shore of Parteen Basin and the Kilmastulla River. Therefore, increased human presence and/or noise and vibration associated with the construction of the RWI&PS, has the potential to (at least temporarily) displace commuting or foraging otter.

5.1.3.1.2 Atlantic Salmon, Sea Lamprey, Brook Lamprey, and River Lamprey

741. The levels of vibration for pipe jacking are likely to be of a similar level to pile driving and would depend on the plant items used and the nature of the material that the pipe is being jacked through. For vibratory piling the assessment for the Proposed Project has calculated the Peak Particle Velocity (PPV) of 8mm/s at 15m. This would be broadly similar to the references within BS 5228-2 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Vibration (British Standards Institution (BSI) 2014a) for measured data on vibration levels at various plan distances as reported in Table 5.5. For vibratory piling, the maximum quoted PPV within BS 5228-2 is 11 millimetres per second (mm/s) at 10m during pile driving activity. The actual levels would depend on the nature of the material that the sheet piles are being driven through and the method used. Vibratory sheet pile driving is proposed, except for locations where soils are too hard or dense, for which an impact hammer would be used instead.

Table 5.5: Vibration Levels at Various Plan Distances

BS 5528-2 Ref	Soil Conditions	Description	Plan Distance	PPV (mm/s)
D.10.C.44	4m to 5m soft saturated sand over soft to firm clay	Vibratory pile drivers	6m	2.6
D.8.C.5	4m to 5m soft saturated sand over soft to firm clay	Air hammer driving sheets	6m	1.1
D.8.C.8	Overburden	Diesel hammer driving sheets	1m	20
D.8.C.8	Overburden	Air hammer driving sheets	1m	10

742. Increased human presence, and noise and vibration associated with the construction of the RWI&PS could result in the displacement of fish species from the area. Given the temporary nature of any vibration associated with the installation of the secant piles, and the short-term nature of general construction works (up to 12 months, which for the most part would be carried out within the secant piles), disturbance levels would not permanently displace fish species from Parteen Basin in the ZoI of the Proposed Project.

5.1.3.2 Construction Working Width

743. The Proposed Project does not cross or lie within any designated European sites with the exception of the Lower River Shannon SAC. However, as mentioned in Section 4.1, the majority of the watercourses crossed by the Proposed Project have a link to one or more European sites. The Proposed Project would have a hydrological pathway for effect to 14 European sites (Table 6.2). In summary, 70 of the 604 watercourse crossings with a link to one or more European sites are 1km or less from the linked European site (namely the Lower River Shannon SAC and Lisduff Fen SAC), 138 are between 1km and 5km, 167 are between 5km and 10km, and 229 are greater than 10km from a European site.

744. Watercourse crossings along the Construction Working Width would be undertaken by open cut techniques or trenchless methods (Section 3.6.2) and along the route of the 38 kV Uprate Works by the stringing of conductors over watercourses (Section 3.6.3.8). With the exception of the stringing of conductors over the Lower River Shannon SAC, none of the watercourse crossings are located within the boundaries of a European site; however, all are located upstream of European sites, and therefore the potential exists for qualifying interest species to occur at the crossing sites.

745. No instream works are proposed for the trenchless crossing methods or for the 38 kV Uprate Works crossings. The trenchless construction would generate vibration in the substrate, which has the potential to be transmitted to the riverbed and watercourse itself. The calculation of this is extremely complex. However, the potential impact is related to the depth below the riverbed and is generally far enough below to not contribute any detectable vibration in the substrate, much lower than any level that could lead to injury or disturbance to fish, or damage to nests or redds. The rotational nature of the vibration source in trenchless construction, the drill, is not impulsive, and impulsivity is most likely to lead to higher risk of adverse impact. Monitoring would be required in the event of significant concerns.

746. Therefore, the biggest risk of disturbance/displacement effects from construction works is associated with open cut crossings only. Of the 492 open cut watercourse crossings (EIAR Appendix A8.14: Watercourse Crossing Data), 263 drain to four European sites protected for aquatic qualifying interest species that are mobile and have the potential to occur upstream within the boundaries of the Proposed Project (namely: sea, brook and river lamprey, Atlantic salmon, white-clawed crayfish, twaite shad (*Alosa fallax*), and otter). The preferred habitat for twaite shad is estuarine or coastal waters but it comes into the lower reaches of rivers for spawning from May to June. Thus, this species is not likely to occur inland within the Proposed Project and therefore it was scoped out from the assessment. Of the 263 open cut watercourse crossings, aquatic ecology surveys undertaken between 2016 and 2024 found that 70 were considered suitable to support salmonids, lamprey, crayfish and/or otter (Table 5.6). These 70 watercourse crossings drain to the following European sites:

- Lower River Shannon SAC (002165)
- River Shannon Callows SAC (000216)
- River Barrow and River Nore SAC (002162)
- River Boyne and River Blackwater SAC (002299).

747. It should be noted the other 193 watercourse crossings that were not considered suitable to support aquatic qualifying interest species also drain to the same four European sites listed above.

748. Thus, there is potential for aquatic qualifying interest species from the populations associated with the European sites listed above, to occur at the 70 crossings listed in Table 5.6, and therefore there is potential for disturbance to or displacement of these species during the Construction Phase. In the case of open cut crossings, watercourses would be dammed and fish would be temporarily removed using electrofishing equipment prior to works taking place. Design and choice of temporary crossing structures will provide for passage of fish and macroinvertebrates, protect important fish habitats, and prevent erosion and sedimentation. In the case of trenchless crossings, buffer strips of natural uncleared vegetation will be preserved between construction activity and all rivers, streams and water bodies being crossed.

Table 5.6: Open Cut Crossings with a Pathway to a European Site Designated for Aquatic Dependent Qualifying Interest Species and Potentially Suitable Habitat for such Species

Water Body Crossing ID	Chainage	Fossitt Category	WFD Water Body and EU Code	Links to European Site with Aquatic Dependent Qualifying Interest Species	Spawning Habitat	Protected Species			
						Salmonid	Lamprey	Crayfish	Otter
WBX001	RW–300	FW4 – Drainage Ditch	DRAIN	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	Good – lamprey potential.	None recorded. No potential.	Lamprey potential. River/brook lamprey recorded in 2021.	None recorded. No potential.	None recorded. No potential.
WBX002	RW–400	FW4 – Drainage Ditch	DRAIN	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	Good – lamprey potential.	None recorded. No potential.	Lamprey potential. River/brook lamprey recorded.	None recorded. No potential.	None recorded. No potential.
WBX010	TW–4000	FW4 – Drainage Ditch	DRAIN	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	Low to Moderate potential.	None recorded. Low to moderate potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX012	TW–4900	FW1 – Eroding/ Upland River	DRAIN	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	Low potential – suitable substrate for salmonids but all riffle habitat with no spawning pools. Not suitable for lamprey spawning although may migrate along channel. No crayfish potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX017	TW–19200	FW4 – Drainage Ditch	DRAIN	Yes (Lough Derg (Shannon) SPA)	No potential – no suitable habitat.	None recorded. No potential.	None recorded. Limited potential.	None recorded. No potential.	None recorded. No potential.
WBX023	TWA–7800	FW4 – Drainage Ditch	DRAIN	Yes (Sharavogue Bog SAC)	No potential – no suitable habitat due to being heavily vegetated.	None recorded. No potential.	None recorded. Limited potential.	None recorded. No potential.	None recorded. No potential.
WBX025	TWA–12100	FW4 – Drainage Ditch	DRAIN	Yes (Sharavogue Bog SAC)	None	None recorded. Moderate potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Water Body Crossing ID	Chainage	Fossitt Category	WFD Water Body and EU Code	Links to European Site with Aquatic Dependent Qualifying Interest Species	Spawning Habitat	Protected Species			
						Salmonid	Lamprey	Crayfish	Otter
WBX027	TWA–14800	FW1 – Eroding/ Upland River	DRAIN	Yes (Sharavogue Bog SAC)	Low to Moderate potential – some suitable gravels present.	Brown trout recorded in 2018.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WBX030	TWA – 21100	FW2 – Depositing/ Lowland River	DRAIN	Yes (Dovegrove Callows SPA)	Possible spawning habitat.	None recorded. Moderate potential.	Possible spawning habitat.	None recorded. Moderate potential.	None recorded. Otter potential.
WBX033	TWA–21300	FW2 – Depositing/ Lowland River	DRAIN	Yes (Dovegrove Callows SPA)	No potential.	None recorded. No potential.	None recorded. Low potential.	None recorded. No potential.	None recorded. No potential.
WBX034	TWA–27200	FW4 – Drainage Ditch	DRAIN	Yes (Dovegrove Callows SPA)	Good – potential downstream with suitable gravels and silt.	Brown trout recorded in 2017.	Positive scoop test for lamprey: seven juvenile river/brook in three scoops.	None recorded. No potential.	Potential slides.
WBX037	TWB – 300	FW4 – Drainage Ditch	DRAIN	Yes (Dovegrove Callows SPA)	No potential – no suitable habitat.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	Otter signs recorded (tracks and scat) approximately 5m outside Proposed Project along bank, and also within the Proposed Project.
WBX038	TWB–4600	FW1 – Eroding/ Upland River	DRAIN	Yes (River Shannon Callows SAC and Middle Shannon Callows SPA)	–	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WBX039	TWB–4800	FW4 – Drainage Ditch	DRAIN	Yes (River Shannon Callows SAC and Middle Shannon Callows SPA)	Low potential – lack of gravel/cover and appropriate flow.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.

Water Body Crossing ID	Chainage	Fossitt Category	WFD Water Body and EU Code	Links to European Site with Aquatic Dependent Qualifying Interest Species	Spawning Habitat	Protected Species			
						Salmonid	Lamprey	Crayfish	Otter
WBX057	TWC–6900	FW4 – Drainage Ditch	DRAIN	Yes (Charleville Wood SAC)	Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WBX058	TWC–10000	FW4 – Drainage Ditch	DRAIN	Yes (Charleville Wood SAC)	Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WBX060	TWC–10300	FW4 – Drainage Ditch	DRAIN	Yes (Charleville Wood SAC)	Low potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded.
WBX061	TWC–10400	FW4 – Drainage Ditch	DRAIN	Yes (Charleville Wood SAC)	Low potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded.
WBX062	TWC–11100	FW4 – Drainage Ditch	DRAIN	Yes (Charleville Wood SAC)	Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WBX068	TWC – 23900	FW4 – Drainage Ditch	DRAIN	Yes (River Barrow and River Nore SAC)	No potential – no suitable habitat.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	Prints and potentially used entrance through hedgerow to watercourse recorded in 2019.
WBX092	TWB–13600	FW4 – Drainage Ditch	DRAIN	Yes (River Shannon Callows SAC and Middle Shannon Callows SPA)	No potential – no suitable habitat.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Otter potential.

Water Body Crossing ID	Chainage	Fossitt Category	WFD Water Body and EU Code	Links to European Site with Aquatic Dependent Qualifying Interest Species	Spawning Habitat	Protected Species			
						Salmonid	Lamprey	Crayfish	Otter
WBX093	TWB–14800	FW4 – Drainage Ditch	DRAIN	Yes (River Shannon Callows SAC and Middle Shannon Callows SPA)	No potential – no suitable habitat.	None recorded. No potential.	None recorded. Low potential.	None recorded. No potential.	None recorded. Low potential.
WBX094	TWB–19100	FW4 – Drainage Ditch	DRAIN	Yes (Charleville Wood SAC)	Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WBX097	TWC–11000	FW4 – Drainage Ditch	DRAIN	Yes (Charleville Wood SAC)	Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WBX107	TWB–4700	FW1 – Eroding/ Upland River	DRAIN	Yes (River Shannon Callows SAC and Middle Shannon Callows SPA)	–	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WBX112	Off pipeline	FW2 – Depositing/ Lowland River	DRAIN	Yes (Dovegrove Callows SPA)	None recorded. No potential.	None recorded. Potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WCX003	TW–700	FW1 – Eroding/ Upland River	KILMASTULLA_050 (IE_SH_25K041000)	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	Good.	None recorded. Trout potential.	None recorded. Lamprey potential.	None recorded. Crayfish potential.	None recorded. Otter potential.
WCX004	TW–1000	FW1 – Eroding/ Upland River	KILMASTULLA_050 (IE_SH_25K041000)	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	Low to Moderate – riffles, flow and glide present for salmonids but weir (80cm high) prevents fish pass.	Moderate potential – weir (80cm high) prevents fish pass. Potential brown trout observed in 2018.	Undercut banks with silty banks and pools suitable for lampreys. Brook lamprey recorded upstream of crossing.	None recorded. Crayfish potential.	Otter glide and potential holt within Proposed Project in 2016. Potential slides recorded in 2019.

Water Body Crossing ID	Chainage	Fossitt Category	WFD Water Body and EU Code	Links to European Site with Aquatic Dependent Qualifying Interest Species	Spawning Habitat	Protected Species			
						Salmonid	Lamprey	Crayfish	Otter
WCX005	TW–7500	FW1 – Eroding/Upland River	KILMASTULLA_030 (IE_SH_25K040800)	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	Moderate.	Trout recorded in 2017.	Undercut bank with glide suitable for lamprey. Suitable habitat for brook lamprey recorded downstream.	None recorded. Crayfish potential. Downstream habitat not suitable for crayfish.	None recorded. Otter potential.
WCX006	TW–8500	FW1 – Eroding/Upland River	KILMASTULLA_020 (IE_SH_25K040300)	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	Low to Moderate – heavy siltation.	None recorded. Salmonid potential.	None recorded. Lamprey potential – Undercut banks, silt banks suitable for lampreys.	None recorded. Crayfish potential.	None recorded. Otter potential.
WCX008	TW–10200	FW1 – Eroding/Upland River	KILMASTULLA_020 (IE_SH_25K040300)	Yes (Lower River Shannon SAC)	Low potential.	None recorded. Low potential.	Moderate potential.	No Potential	None recorded. Otter potential.
WCX009	TW–10500	FW1 – Eroding/Upland River	KILMASTULLA_020 (IE_SH_25K040300)	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	No potential – no suitable habitat.	None recorded. No potential.	None recorded. Low potential.	None recorded. No potential.	Couch in gorse cover with slide into water recorded in 2019.
WCX010	TW–11200	FW4 – Drainage Ditch	KILMASTULLA_020 (IE_SH_25K040300)	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	No potential – no suitable habitat.	None recorded. No potential.	Potential. Scoop test positive for lamprey ammocoetes.	None recorded. No potential.	None recorded. No potential.
WCX012	TW–15000	FW2 – Depositing/Lowland River	ARDGREGANE STREAM_020 (IE_SH_25A040400)	Yes (Lough Derg (Shannon) SPA)	Low potential.	Potential. Brown trout sighting.	No potential.	No potential.	No potential.

Water Body Crossing ID	Chainage	Fossitt Category	WFD Water Body and EU Code	Links to European Site with Aquatic Dependent Qualifying Interest Species	Spawning Habitat	Protected Species			
						Salmonid	Lamprey	Crayfish	Otter
WCX013	TW–16500	FW2 – Depositing/ Lowland River	ARDGREGANE STREAM_020 (IE_SH_25A040400)	Yes (Lough Derg (Shannon) SPA)	Moderate – good habitat for lamprey with lots of cover from vegetation, good flow and depth, silty banks for eggs.	Good potential – Salmonids recorded (brown trout recorded in 2017).	Lamprey ammocoetes recorded (6cm to 8cm). Brook lamprey recorded in 2017.	Potential. Crayfish recorded.	Potential
WCX021	TW–35000	FW2 – Depositing/ Lowland River	BALLYFINBOY_040 (IE_SH_25B020550)	Yes (Lough Derg, North-east Shore SAC and Lough Derg (Shannon) SPA)	Good.	Potential – brown trout observed in 2017.	Potential – lamprey ammocoetes recorded in 2024.	None recorded. Crayfish potential.	None recorded. Otter potential.
WCX023	TWA–5600	FW2 – Depositing/ Lowland River	KILCOMIN STREAM_030 (IE_SH_25K150085)	Yes (Sharavogue Bog SAC)	Low potential.	Potential.	Potential.	No potential.	No potential.
WCX024	TWA–8000	FW2 – Depositing/ Lowland River	SHINRONE STREAM_010 (IE_SH_25S110100)	Yes (Sharavogue Bog SAC)	No potential – dry channel during low flow periods.	No potential.	No potential.	No potential.	No potential.
WCX025	TWA–9400	FW1 – Eroding/ Upland River	SHINRONE STREAM_010 (IE_SH_25S110100)	Yes (Sharavogue Bog SAC)	Low potential – good riffle habitat but too much silt to be deemed good potential for spawning. No undercut banks or sufficient depth in silt for lamprey.	Low potential.	No potential.	No potential.	No potential.
WCX027	TWA–17500	FW1 – Eroding/ Upland River	ROCK (BIRR)_010 (IE_SH_25R020050)	Yes (Lisduff Fen SAC)	Moderate – suitable for lamprey and salmonids.	Potential.	Potential. Lamprey recorded in 2024.	Potential. Crayfish recorded in 2024.	Tracks, slide and potential couch recorded in 2019.
WCX028	TWA–23800	FW2 – Depositing/ Lowland River	CLAREEN STREAM/FUARAWN_020 (IE_SH_25C130600)	Yes (Dovegrove Callows SPA)	Low to Moderate potential – some suitable gravels present.	Trout present in 2016. No potential.	No potential.	No potential.	Track from river, potential couches on riverbank recorded in 2019. More tracks from river to field.

Water Body Crossing ID	Chainage	Fossitt Category	WFD Water Body and EU Code	Links to European Site with Aquatic Dependent Qualifying Interest Species	Spawning Habitat	Protected Species			
						Salmonid	Lamprey	Crayfish	Otter
WCX029	TWA–24800	FW1 – Eroding/ Upland River	CLAREEN STREAM/FUARAWN_020 (IE_SH_25C130600)	Yes (Dovegrove Callows SPA)	Low potential – insufficient gravels.	Salmonid potential. Brown trout recorded (n=15, 2 to 3yrs old).	Lamprey potential, silt on edges, scoop test positive.	Limited crayfish potential due to unsuitable substrate and calcification.	Otter potential. Otter foraging potential, no resting potential.
WCX033	TWB–1400	FW2 – Depositing/ Lowland River	CAMCOR_030 (IE_SH_25C020500)	Yes (Dovegrove Callows SPA)	Low potential.	Salmonid potential.	Lamprey potential.	No potential.	No potential.
WCX034	TWB–6600	FW4 – Drainage Ditch	KYLEBOHER_010 (IE_SH_25J270990)	Yes (River Shannon Callows SAC and Middle Shannon Callows SPA)	Low potential – no flow, heavily silted substrate.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WCX035	TWB–7800	FW4 – Drainage Ditch	SILVER (KILCORMAC)_030 (IE_SH_25S020400)	Yes (River Shannon Callows SAC and Middle Shannon Callows SPA)	Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WCX040	TWC–1000	FW4 – Drainage Ditch	CLODIAGH (TULLAMORE)_030 (IE_SH_25C060340)	Yes (River Barrow and River Nore SAC)	Low to Moderate potential – trout potential.	No potential.	No potential.	No potential.	No potential.
WCX041	TWC–3300	FW1 – Eroding/ Upland River	MEELAGHANS_010 (IE_SH_25M520760)	Yes (Charleville Wood SAC)	Low potential.	No potential.	No potential.	No potential.	No potential.

Water Body Crossing ID	Chainage	Fossitt Category	WFD Water Body and EU Code	Links to European Site with Aquatic Dependent Qualifying Interest Species	Spawning Habitat	Protected Species			
						Salmonid	Lamprey	Crayfish	Otter
WCX042	TWC–5000	FW2 – Depositing/ Lowland River	MEELAGHANS_010 (IE_SH_25M520760)	Yes (Charleville Wood SAC)	Low potential – mainly silt substrate and vegetation with some gravels. Some fine gravels over riffle on edge of Proposed Project boundary downstream (80m upstream of rail crossing). Uncut bank and overhanging vegetation recorded. Poor potential within Proposed Project boundary due to being heavily vegetated. Less vegetated and more gravels 150m upstream of Proposed Project at woodland.	Low potential.	Low potential – checked approximately 10m section of potential suitable habitat 120m downstream of Proposed Project. Silt substrate checked with hand search and net – no juvenile lamprey recorded. No suitable habitat within Proposed Project. Soft sediments 150m upstream of Proposed Project but no juvenile lamprey recorded.	None recorded. Good potential – well oxygenated, calcareous, and vegetated watercourse.	Potential otter scat recorded in 2019.
WCX043	TWC–5600	FW2 – Depositing/ Lowland River	TULLAMORE_020 (IE_SH_25T030100)	Yes (Charleville Wood SAC)	No potential – no suitable habitat	None recorded. No potential.	None recorded. Low potential.	None recorded. No potential.	None recorded. No potential.
WCX044	TWC–8900	FW2 – Depositing/ Lowland River	TULLAMORE_010 (IE_SH_25T030030)	Yes (Charleville Wood SAC)	No potential – no spawning habitat recorded within Proposed Project or upstream/downstream where accessible. Watercourse choked with vegetation.	No potential.	Potential habitat for juvenile lamprey in undercut banks.	No potential.	No potential.

Water Body Crossing ID	Chainage	Fossitt Category	WFD Water Body and EU Code	Links to European Site with Aquatic Dependent Qualifying Interest Species	Spawning Habitat	Protected Species			
						Salmonid	Lamprey	Crayfish	Otter
WCX045	TWC–9700	FW2 – Depositing/ Lowland River	TULLAMORE_010 (IE_SH_25T030030)	Yes (Charleville Wood SAC)	Low potential – watercourse in flood but potential spawning gravels within Proposed Project visible and potentially good riffle in lower flows. Uncut banks. River enclosed with vegetation.	Low potential.	Low potential.	No potential.	Track visible in cow pat in 2019.
WCX048	TWC–18900	FW2 – Depositing/ Lowland River	DAINGEAN_030 (IE_SE_14D060400)	Yes (River Barrow and River Nore SAC)	Low potential – too deep to see any potential spawning gravels.	Potential - brown trout recorded in 2018.	Low potential – vertical rather than undercut banks.	Low potential – fast flow and no suitable vegetation.	Potential inactive holt in right bankside, overgrown with vegetation recorded in 2019. Run from fields into wet ditch, numerous other runs visible along ditch heading west. Good foraging habitat noted.
WCX049	TWC–20300	FW2 – Depositing/ Lowland River	ESKER STREAM_010 (IE_SE_14E010100)	Yes (River Barrow and River Nore SAC)	Low potential	No potential	Low potential.	Low potential.	Run alongside river at fence with slide entering water recorded in 2019. Additional run and slide along rivers edge.
WCX054	TWC–22800	FW2 – Depositing/ Lowland River	ESKER STREAM_020 (IE_SE_14E010200)	Yes (River Barrow and River Nore SAC)	Low potential	No potential.	Potential.	No potential.	None recorded. Otter potential.
WCX055	TWD - 3500	FW2 – Depositing/ Lowland River	FIGILE_030 (IE_SE_14F010200)	Yes (River Barrow and River Nore SAC)	No potential – watercourse heavily vegetated and peat substrate.	No potential.	No potential.	No potential – acidic pH due to surrounding peatlands.	Slide going into water, numerous runs in field recorded in 2019.

Water Body Crossing ID	Chainage	Fossitt Category	WFD Water Body and EU Code	Links to European Site with Aquatic Dependent Qualifying Interest Species	Spawning Habitat	Protected Species			
						Salmonid	Lamprey	Crayfish	Otter
WCX058	TWD–8900	FW2 – Depositing/ Lowland River	FIGILE_020 (IE_SE_14F010100)	Yes (River Barrow and River Nore SAC)	No potential – low flow. Water too deep to view any spawning gravels. Peat surroundings so spawning gravels unlikely.	Potential.	Potential.	No potential – acidic pH due to surrounding peatlands.	None recorded. No potential.
WCX059	TWD–14400	FW2 – Depositing/ Lowland River	ABBEYLOUGH_010 (IE_SE_14A010840)	Yes (River Barrow and River Nore SAC)	No potential – No suitable habitat	None recorded. Salmonid potential	Potential.	Potential.	Potential.
WCX060	TWD–18100	FW2 – Depositing/ Lowland River	FIGILE_010 (IE_SE_14F010061)	Yes (River Barrow and River Nore SAC)	Limited spawning or nursery habitat for salmonid or lamprey.	None recorded. Low potential.	No potential.	No potential.	No potential.
WCX061	TWD–24300	FW2 – Depositing/ Lowland River	BLACKWATER (LONGWOOD)_010 (IE_EA_07B020060)	Yes (River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA)	No potential – water quality very poor, no flow, stagnant, anoxic odour and oil sleek. Fuel drum in water upstream of Proposed Project. No gravels. Peat and silt substrate. Bog upstream.	Salmonid potential.	Potential.	Potential.	Potential slide recorded in 2019. Potential.
WCX062	TWD–26400	FW2 – Depositing/ Lowland River	BLACKWATER (LONGWOOD)_010 (IE_EA_07B020060)	Yes (River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA)	No potential – too dark/deep to see substrate but likely no gravels. Low flow/ stagnant water. No suitable juvenile lamprey habitat.	Salmonid potential.	Lamprey potential	Potential	Otter potential.
WCX064	TWD–28500	FW2 – Depositing/ Lowland River	BLACKWATER (LONGWOOD)_010 (IE_EA_07B020060)	Yes (River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA)	No potential – no suitable habitat. No flow, and peaty substrate. Not suitable for crayfish.	None recorded. No potential.	None recorded. Limited potential.	None recorded. No potential.	None recorded. No potential.

Water Body Crossing ID	Chainage	Fossitt Category	WFD Water Body and EU Code	Links to European Site with Aquatic Dependent Qualifying Interest Species	Spawning Habitat	Protected Species			
						Salmonid	Lamprey	Crayfish	Otter
WCX065	TWD–29100	FW2 – Depositing/ Lowland River	BLACKWATER (LONGWOOD)_010 (IE_EA_07B020060)	Yes (River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA)	Low potential – potential for juvenile lamprey due to silt beds. No potential for salmonids due to no spawning gravels observed, silt and organic substrate, low flow, poor quality.	None recorded. Low potential – no spawning potential but suitable salmonids habitat (pool and riffles, undercut banks, instream vegetation).	None recorded. Low potential – silt substrates.	No potential.	Run and slides from edge of field into water recorded in 2019.
WCX066	TWD–32700	FW2 – Depositing/ Lowland River	CLONSHANBO_010 (IE_EA_09C030300)	Yes (Rye Water Valley/Carton SAC)	No potential – no suitable habitat.	Potential.	Low Potential.	No potential.	No potential.
WCX067	TWE–700	FW2 – Depositing/ Lowland River	LYREEN_010 (IE_EA_09L020035)	Yes (Rye Water Valley/Carton SAC)	No potential – low flow, silt substrate, no suitable gravels or riffle.	No potential.	No potential.	Potential	None recorded. No potential.
WCX068	TWE–1800	FW2 – Depositing/ Lowland River	LYREEN_010 (IE_EA_09L020035)	Yes (Rye Water Valley/Carton SAC)	Good – suitable spawning gravels approximately 200m upstream of Proposed Project. Undercut banks. Overhanging vegetation. No suitable silt beds for juvenile lamprey.	None recorded. Good potential.	None recorded. Moderate potential – suitable spawning gravels approximately 200m upstream of Proposed Project. No suitable silt beds for juvenile lamprey. None recorded during kick net sweep and hand search along length of transect.	None recorded. No potential due to lack of in-stream vegetation.	None recorded. Otter potential.

Water Body Crossing ID	Chainage	Fossitt Category	WFD Water Body and EU Code	Links to European Site with Aquatic Dependent Qualifying Interest Species	Spawning Habitat	Protected Species			
						Salmonid	Lamprey	Crayfish	Otter
WCX069	TWE–2400	FW1 – Eroding/ Upland River	CLONSHANBO_020 (IE_EA_09C030600)	Yes (Rye Water Valley/Carton SAC)	Moderate – some spawning gravels and riffle within Proposed Project. Undercut banks and overhanging vegetation. Silt beds with potential for juvenile lamprey.	None recorded. Moderate potential.	None recorded. Moderate potential – silt beds with potential for juvenile lamprey.	None recorded. Low potential – undercut banks and overhanging vegetation but no in-stream vegetation.	None recorded. No potential.
WCX070	TWE–3600	FW2 – Depositing/ Lowland River	LYREEN_010 (IE_EA_09L020035)	Yes (Rye Water Valley/Carton SAC)	Low potential	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WCX078	Off Pipeline	FW1 – Eroding/ Upland River	CAMCOR_050 (IE_SH_25C020700)	Yes (Dovegrove Callows SPA)	–	Potential	Potential	Potential	–
WCX084	Off Pipeline	FW4 – Drainage Ditch	CAMCOR_040 (IE_SH_25C020600)	Yes (Dovegrove Callows SPA)	–	No potential	No potential	No potential	–

5.1.3.3 38 kV Uprate Works

749. No instream works are proposed and buffer zones (minimum of 10m) will be maintained between the proposed 38 kV Uprate Works and watercourses reducing the potential for direct disturbance to any qualifying interest species or their breeding/resting sites.

750. No signs of otter or otter breeding or resting sites were recorded during the ecological field surveys; however, otter is present and considered common throughout aquatic and riparian zones within the Proposed Project. As there were no otter breeding or resting places, holt or couch sites, present within the proposed 38 kV Uprate Works, there would not be any loss of holt or couch sites as a result of construction works. Considering the elusive nature of this species and its wide territorial range, combined with the short-term nature of the works, impacts from visual/physical presence and noise would not have a likely significant negative effect on the otter population.

5.1.3.4 Bird Species of Conservation Concern

751. Increased human presence, and noise and vibration associated with general construction works (and also impulse noise disturbance, such as drilling that would be required to construct the secant piles in Parteen Basin) has the potential to disturb, and potentially displace, birds from important habitat areas. This could apply to areas both within SPA sites or supporting habitat areas remote from the SPA site itself.

752. The closest SPAs to the Proposed Project are the Slievefelim to Silvermines Mountains SPA and the Slieve Bloom Mountains SPA, which are located 1.5km and 2.5km south-east, respectively. These sites are both designated for hen harrier. Hen harrier is unlikely to be dependent on the habitats within the Proposed Project. This assessment is based on the findings of low levels of flight activity on-site and the availability of suitable foraging habitat within the wider surroundings (EIAR Appendix A8.22: Winter Bird Surveys Summary Report). Furthermore, according to Madders (2004), during wind farm construction (which would be expected to have a similar level of construction activity as pipeline construction), displacement of hen harrier has been suggested potentially to occur up to 500m around construction sites with some disruption up to 1km, depending on the line of visibility. In reviews by Ruddock and Whitfield (2007) and Goodship and Furness (2022) of disturbance distances in selected bird species, expert opinion suggested a maximum buffer of 300m to 750m for hen harrier. This is slightly lower than that indicated by Currie & Elliott's (1997) recommendation of 500m to 1,000m, whilst Petty (1996) recommended 500m to 600m. The expert survey range is compatible with the estimated disturbance/displacement suggested by Madders (2004) during wind farm construction, i.e. up to 1km. Thus, while it is unlikely hen harrier from the Slievefelim to Silvermines Mountains SPA or the Slieve Bloom Mountains SPA would be displaced by construction activity associated with the Proposed Project, birds from these SPAs may use the habitats within the Proposed Project for foraging, as it is within the hen harrier's core foraging range (2km; SNH 2016). The construction of the Proposed Project could result in a reduction of supporting habitat for this species.

753. The Lough Derg (Shannon) SPA is located approximately 4km north of the Proposed Project. This site is designated for tufted duck (wintering, possible breeding), goldeneye (wintering only), cormorant (breeding and wintering), and common tern (breeding only). As mentioned in Section 4.3.1.2, the breeding bird surveys carried out at Parteen Basin and Lough Derg between 2015 and 2024 recorded tufted duck, cormorant and common tern. Tufted duck is a probable breeding species at Lough Derg. Although no breeding behaviour was observed, adults were recorded in suitable breeding habitat at Parteen Basin in all survey years. In 2015 a large cormorant colony was noted on the northern shoreline of Lough Derg at Portumna Forest Park (maximum 128 individuals and minimum 54+ active nests). Breeding birds were not surveyed for at Lough Derg in 2016 or 2017. Although cormorant individuals were recorded at Parteen Basin from 2016 to 2024, there was no evidence of breeding for this species at the site. In 2015 common tern (maximum count: seven adult individuals) were recorded as likely

breeding at one location: Goat Island in Lough Derg, approximately 26km north of the RWI&PS (EIAR Appendix A8.21: Breeding Bird Surveys Summary Report). The wintering bird surveys carried out at Parteen Basin and Lough Derg between 2015 and 2025 also recorded tufted duck, cormorant and goldeneye (EIAR Appendix A8.22: Winter Bird Surveys Summary Report). Tufted duck and goldeneye were most often recorded on open water in the centre of Parteen Basin reservoir and in fringing habitat on the western shore, whereas cormorant was most often recorded in fringing habitat on the western shore and roosting on the islands within Lough Derg. While the Lough Derg (Shannon) SPA would not be directly impacted by the Proposed Project, special conservation interest species from this site may move outside the SPA and down into Parteen Basin. Lough Derg (Shannon) SPA special conservation interest species using Parteen Basin as a supporting habitat, may be affected by disturbance impacts during the Construction Phase of the Proposed Project.

754. According to Goodship and Furness (2022) goldeneye can be highly sensitive to disturbance, potentially displacing at distances from 150m to 800m during the non-breeding season, although birds generally immediately re-settled elsewhere on the water. As a species that is commonly resident in urban parks, tufted duck are significantly more tolerant of human disturbance but would still be displaced by human activity in close proximity (Hockin *et al.* 1991). Breeding cormorant may be impacted by human disturbance at distances of 50m to 100m (Carney and Sydeman 1999) and are particularly susceptible during the chick-rearing period from April to June (Gilbert *et al.* 1998). Breeding common terns may be impacted by human disturbance at approach distances of 100m to 200m (Carney & Sydeman, 1999). In general, the shallower waters of the wetland habitats on the western shore of Parteen Basin were favoured by bird aggregations at the reservoir. They generally did not concentrate on the eastern shore in the study area of the RWI&PS. Parteen Basin is greater than or equal to 1km in width from east to west for the majority of its length. This width provides sufficient distance between feeding birds on the western shore of Parteen Basin and construction activities on the eastern shore thereby limiting the potential for ecologically significant disturbance/displacement effects.

5.1.3.4.1 General Construction Activity Disturbance

755. Based on the findings of the study prepared for Humber INCA, Cutts *et al.* (2009) investigating the effects of disturbance on foraging and roosting waterbirds, in terms of a response to human presence, minimal effects would be expected beyond 300m. In terms of construction noise, within 100m of the noise, levels below 50dB would not be expected to result in any response from foraging or roosting birds. Noise levels between 50dB and 70dB would provoke a moderate effect/level of response from birds – i.e. birds becoming alert and some behavioural changes (e.g. reduced feeding activity) – but birds would be expected to become habituated to noise levels within this range. Noise levels above 70dB would likely result in birds moving out of the affected zone or leaving the site altogether. This is supported by the findings of Wright *et al.* (2010) which found that noise levels above 60dB resulted in behavioural responses, with birds abandoning the site in response to noise levels above 70dB.

756. Noise levels associated with construction were calculated in accordance with the methodology set out in BS 5228-1 (BSI 2014b). This standard sets out sound power and sound pressure levels for plant items normally encountered on construction sites, which in turn enables the prediction of noise levels at selected locations.

757. Noise predictions are presented to highlight reasonably worst-case scenario noise levels at Noise Sensitive Locations (NSL) and to discuss the good practice and specific mitigation measures that can be utilised to reduce effects as far as is reasonably practicable. All plant and associated on-times used within the construction calculations are supplied within EIAR Appendix A6.3 (Construction Noise Plant Lists).

758. BS 5228-1 (BSI 2014b) sets out typical noise levels for items of construction plant. The tables in the following sections set out assumed plant items during the key phases of construction with the associated source reference from BS 5228-1. In preparing noise prediction calculations, reference has been made to EIAR Chapter 5 (Construction & Commissioning) which provides, amongst other information, the likely construction methods, locations, durations and hours of work. The calculations are based on the plant utilisation assumptions and percentage on-times provided by the design team. All calculations work on the worst-case scenario that assumes no acoustic screening (i.e. barriers/fencing) in place between the site works and the nearest NSLs.

759. Table 5.7 presents outline noise calculations, considering the typical anticipated methods of construction, at varying distances from the construction works relating to the Construction Compounds and Pipe Storage Depots.

Table 5.7: Indicative Noise Calculations for Construction of Construction Compounds and Pipe Storage Depots

Phase of Work (Activity)	Cumulative Plant Noise Level at 10m Distance ($dB L_{Aeq,T}$)	Calculated Construction Noise Level $dB L_{Aeq,1hr}$ at Distance from Works (m)				
		20m	30m	40m	50m	60m
Site Clearing and Preparation (including fencing)	83	77	69	66	64	62
Excavations/Concrete Foundations/ Prefabricated buildings	83	77	69	66	64	62
Temporary Laydown Area	84	78	70	67	65	63
Site Services Temporary	82	76	68	65	63	61
Roadworks, Landscaping	72	66	58	55	53	51
Reinstatement	84	78	70	67	65	63

760. Table 5.8 presents outline noise calculations, considering the typical anticipated methods of construction, at varying distances from the construction works associated with the 38 kV Uprate Works.

Table 5.8: Indicative Noise Calculations for Construction of 38 kV Uprate Works

Phase of Work (Activity)	Calculated Construction Noise Level $dB L_{Aeq,1hr}$ at Distance from Works (m)				
	25m	40m	50m	100m	150m
Excavations and Below Ground Concrete Structures	84	72	67	65	57
Pipe Installation and Backfilling (38kV - Duct Installation and Backfilling)	85	73	68	66	58
Reinstatement	83	71	66	64	56

761. Table 5.9 presents noise calculations for each of the infrastructure sites, considering the anticipated methods of construction, distance to NSLs and expected noise levels from the chosen construction tools and equipment.

Table 5.9: Indicative Construction Noise Calculations for the Infrastructure Sites

Infrastructure Site	Phase	Cumulative Plant Noise Level at 10m Distance (dB $L_{Aeq,T}$)	Predicted Construction Noise Level at Nearest NSL (600m) (Cumulative Per Phase) dB $L_{Aeq,T}$
RWI&PS	Site clearing and preparation	82	36
	Excavations and below-ground concrete structures	89	43
	Construction of above-ground structures	85	39
	Construction of Building	85	39
	Temporary Laydown Area	84	38
	Pipe Installation and Backfilling	82	36
	Roadworks, landscaping	84	38
	Reinstatement	85	39
	Remove Wayleave and Fencing	81	35
Infrastructure Site	**Phase**	**Cumulative Plant Noise Level at 10m Distance (dB LAeq,T)**	**Predicted Construction Noise Level at Nearest NSL (350m) (Cumulative Per Phase) dB LAeq,T**
WTP	Site clearing and preparation	85	44
	Excavations and below-ground concrete structures	88	47
	Construction of above-ground structures	86	45
	Construction of Building	85	44
	Temporary Laydown Area	84	43
	Pipe Installation and Backfilling	82	41
	Roadworks, landscaping	83	42
	Reinstatement	85	44
	Remove Wayleave and Fencing	81	40
Infrastructure Site	**Phase**	**Cumulative Plant Noise Level at 10m Distance (dB LAeq,T)**	**Predicted Construction Noise Level at Nearest NSL (280m) (Cumulative Per Phase) dB LAeq,T**
BPT	Site clearing and preparation	82	44
	Excavations and Below Ground Structures	88	50
	Construction of Above Ground Structures	81	43
	Construction of Building	85	47
	Temporary Laydown Area	84	46
	Pipe Installation and Backfilling	82	44
	Roadworks, landscaping	83	45
	Reinstatement	85	47
	Remove Wayleave and Fencing	81	43

Infrastructure Site	Phase	Cumulative Plant Noise Level at 10m Distance (dB LAeq,T)	Predicted Construction Noise Level at Nearest NSL (260m) (Cumulative Per Phase) dB LAeq,T
BPS	Site Clearing and Preparation	82	45
	Excavations and Below Ground Structures	88	51
	Construction of Above Ground Structures	81	44
	Construction of Building	85	48
	Temporary Laydown Area	84	47
	Pipe Installation and Backfilling	82	45
	Roadworks, Landscaping	83	46
	Reinstatement	85	48
	Remove Wayleave and Fencing	81	44
Infrastructure Site	**Phase**	**Cumulative Plant Noise Level at 10m Distance (dB LAeq,T)**	**Predicted Construction Noise Level at Nearest NSL (35m) (Cumulative Per Phase) dB LAeq,T**
TPR	Site Clearing and Preparation	82	66
	Excavations and Below Ground Structures	88	72
	Construction of Above Ground Structures	84	68
	Construction of Building	80	64
	Temporary Laydown Area	84	68
	Pipe Installation and Backfilling	82	66
	Roadworks, Landscaping	83	67
	Reinstatement	83	67
	Remove Wayleave and Fencing	81	65

762. Construction of several permanent and temporary access roads are planned as part of the Proposed Project. Table 5.10 presents outline noise calculations based on the anticipated plant items that would operate, as well as anticipated percentage on-times and numbers of each plant item, at varying distances from the construction works.

Table 5.10: Indicative Noise Calculations for Road Construction

Phase	Cumulative Plant Noise Level at 10m Distance (dB $L_{Aeq,T}$)	Predicted Construction Noise Level at 10m dB $L_{Aeq,T}$	Predicted Construction Noise Level at 20m dB $L_{Aeq,T}$	Predicted Construction Noise Level at 30m dB $L_{Aeq,T}$
Temporary Construction Roads	83	83	77	69

763. A variety of plant and equipment would be required to facilitate the construction of the RWRMs and Treated Water Pipeline. In general, trenching would be predominantly open cut using tracked excavators. Rock breaking would be carried out where ground conditions necessitate this activity. Piled foundations may be required to support pipelines in areas of deep poor ground material. Tunnelling would be required under major crossings such as roadways, railways, canals and watercourses. Trench backfilling would

commence as soon as practicable after pipe testing; reinstatement of subsoil and topsoil would then be carried out. Site Construction Compounds, Pipe Storage Depots and Haul Roads would be necessary at regular intervals along the pipeline and there would be regular heavy vehicle movements and deliveries to and from the Construction Working Width. The distance between construction works and NSLs would vary depending on the location along the route. Table 5.11 presents outline noise calculations based on the anticipated methods of construction and anticipated operating time per day as provided by the design team, at distances of 10m, 20m, 30m and 35m from the construction works. The calculations presented here are considered worst case, assuming all plant items would operate simultaneously at an equal distance to the source; pneumatic breakers would be required for all excavations; and there would be a direct line of sight to NSLs without any acoustic screening from the excavated materials and soil that would be stacked in material laydown areas within the Construction Working Width.

Table 5.11: Indicative Noise Calculations for Pipeline Construction

Phase	Cumulative Plant Noise Level at 10m Distance ($dB L_{Aeq,T}$)	Predicted Construction Noise Level - $dB L_{Aeq,T}$ Cumulative Noise Level per Phase at Closest NSL Distances			
		10m	20m	30m	35m
Site Clearing and Preparation	81	81	75	67	65
Excavations and Below Ground Concrete Structures	84	84	78	70	68
Pipe Installation and Backfilling	86	86	80	72	70
Carthodic Protection System	83	83	77	69	67
Roadworks, Landscaping	84	84	78	70	68
Installation of Valve Chambers	81	81	75	67	65
Reinstatement	85	85	79	71	69
Remove wayleave and Fencing	81	81	75	67	65

764. As part of the pipeline construction, a series of valves would be installed along the pipeline route. Line Valves, Washout Valves and Air Valves installation would occur in conjunction with the construction of the pipeline and the associated noise from the construction of these pipeline features are captured within Table 5.11. The FCV complex, however, would be housed in an underground chamber and would require additional construction processes to those captured within Table 5.11. Table 5.12 outlines the various phases of the construction of the FCV and presents outline noise calculations based on the anticipated methods of construction at the nearest NSLs to the construction of the FCV.

Table 5.12: Indicative Noise Calculations for Flow Control Valve

Phase	Cumulative Plant Noise Level at 10m Distance ($dB L_{Aeq,T}$)	Predicted Construction Noise Level at Nearest NSL (130m) (Cumulative Per Phase) $dB L_{Aeq,T}$
Site Clearing and Preparation (including fencing)	81	51
Excavations and Below Ground Concrete Structures	83	53
Construction of Building	85	55
Construction of FCV chamber	86	56
Pipe Installation and Backfilling	86	56
Roadworks, Landscaping	83	53
Remove Wayleave and Fencing	81	51

765. None of the construction activities listed above would be likely to result in any more than a moderate level of disturbance effect on waterbirds at distances beyond 150m. Any landscape features, vegetation cover or buildings between the construction site and winter bird sites would contribute to further reducing the ambient noise at any given distance. Therefore, 300m is considered to be a precautionary buffer in defining the ZoI of disturbance effects associated with general construction activities (Section 2.2).

766. The disturbance distances at which human disturbance would result in behavioural changes or displacement would be expected to be less than that associated with noise sources (Cutts *et al.* 2009). For the purposes of the assessment, a precautionary approach is taken and the greater buffer distance of 300m is used as the potential disturbance zone.

767. There are no SPA sites within 300m of the Proposed Project; however, increased human presence, and noise and vibration associated with construction works has the potential to disturb, and potentially displace, birds from ex-situ supporting habitats remote from SPA sites. Thus, there is a potential for likely significant effects on the following SPAs within the ZoI of the Proposed Project; Slievefelim to Silvermines Mountains SPA, Slieve Bloom Mountains SPA, Lough Derg (Shannon) SPA, River Little Brosna Callows SPA, River Shannon and River Fergus Estuaries SPA, Slieve Aughty Mountains SPA, River Boyne and River Blackwater SPA, and Poulaphouca Reservoir SPA.

5.1.4 Mortality Risk from Construction Works and Traffic

768. The introduction of construction activity in a rural landscape may temporarily increase the risk of construction traffic collisions with terrestrial fauna species or construction materials accidentally falling into a water body and killing/injuring aquatic fauna; albeit a low level risk of having any long-term population level effects, given the temporary nature of the proposed works. This section discusses those qualifying interest species/special conservation interest species that are relevant to the assessment of effects on European sites within the ZoI of the Proposed Project.

769. The Proposed Project crosses one European site (the Lower River Shannon SAC); however, the proposed Haul Roads traverse nine SACs and six SPAs (see Section 5.1.2.5), albeit along existing roads only. Potential risks associated with construction traffic along Haul Roads and collisions with terrestrial or avian fauna species have been assessed. Of the fifteen European sites crossed by proposed Haul Roads, eleven are protected for terrestrial (otter or marsh fritillary) or avian fauna (listed in Table 6.1) that may be at risk of collision with construction traffic, which could result in mortality. These are:

- River Shannon Callows SAC
- Lough Ree SAC
- River Barrow and River Nore SAC
- Lower River Shannon SAC
- Ballynafagh Lake SAC
- Lough Ree SPA
- Middle Shannon Callows SPA
- River Suck Callows SPA
- River Nore SPA
- River Shannon and River Fergus Estuaries SPA
- Lough Derg (Shannon) SPA.

770. Considering the proposed Haul Roads are built land (BL3) and are not suitable habitat for terrestrial species, the likelihood of construction traffic colliding with qualifying interest species is low. Furthermore, construction traffic would be using proposed Haul Roads during daylight hours and therefore would be unlikely to come upon otter, which are nocturnal in habit. The built land is also unsuitable for marsh fritillary and birds, therefore the risk of collision with these species is also low. Thus, it has been determined that construction traffic movement along the Haul Roads to and from the Proposed Project during the Construction Phase, and the risk of collisions/mortality with qualifying interest species, is not likely to have a significant effect on any European site.

771. During construction of the RWI&PS, there is a risk of construction materials accidently falling into Parteen Basin and killing/injuring aquatic species such as Atlantic salmon and lamprey species. Parteen Basin lies within the Lower River Shannon SAC, therefore at this location these species are listed as qualifying interests for this European site. Otter is a qualifying interest species of the Lower River Shannon SAC. Otter is also an Annex IV species meaning that it is protected wherever it occurs, therefore, it is an offence to deliberately disturb the species, destroy or damage its breeding ground or resting place. No lamprey species and only one Atlantic salmon were recorded in Parteen Basin during baseline surveys (Section 4.3.1.2), however, potential exists for both of these species to occur. Otter activity was recorded around the shore of Parteen Basin and along the Kilmastulla River which form part of the Lower River Shannon SAC. An otter holt was also recorded where the Proposed Project crosses Incha Beg Stream which is indirectly linked to the Lower River Shannon SAC (located approximately 780m north-east of the SAC). Although the location where the Proposed Project crosses Incha Beg Stream is not part of the Lower River Shannon SAC, otters using this watercourse are likely to form part of that European site's otter population. Thus, the construction of the RWI&PS introduces a risk of mortality from collisions with construction traffic/materials or materials falling into Parteen Basin, which have the potential to affect the conservation objectives of salmon, lamprey and otter in the Lower River Shannon SAC.

772. As mentioned, no instream works are proposed for the trenchless crossing methods or for the 38 kV Uprate Works crossings. Therefore, similar to disturbance/displacement effects, the biggest risk of mortality from construction works is associated with open cut crossings only. Of the 492 open cut watercourse crossings (EIAR Appendix A8.14: Watercourse Crossing Data), there is potential for aquatic qualifying interest species to occur at the 67 crossings listed in Table 5.6, and therefore there is potential for mortality of these species or species they rely upon during the Construction Phase. However, in the case of open cut crossings, watercourses would be dammed and fish would be temporarily removed using electrofishing equipment prior to works taking place, thereby avoiding any mortality risk associated with construction works. Design and choice of temporary crossing structures will provide for passage of fish and macroinvertebrates, protect important fish habitats, and prevent erosion and sedimentation. Therefore, the risk of mortality is limited to salmonid eggs, alevins and fry, lamprey ammocoetes, and otter. In the case of trenchless crossings, the launch and reception shafts would be situated outside of the riparian zone, as standard practice, therefore buffer strips of natural uncleared vegetation would be preserved between construction activity and all rivers, streams and water bodies being crossed. This buffer would ensure there is no potential for construction materials to accidentally fall into a water body and kill/injure any qualifying interest species.

5.1.5 Barrier Effect

773. The Proposed Project could potentially pose a physical barrier to aquatic species movement as a result of physical construction. The pipeline at the stream crossings would be installed using either trenchless or open cut techniques.

774. Open cut techniques may result in a temporary (ranging from one week up to one month in a worst-case scenario) barrier to aquatic species (such as lamprey and Atlantic salmon) movement in that catchment. Such a temporary effect would not result in any population level effects, but this is dependent on the affected section of river/stream channel being reinstated to its pre-works condition to maintain the hydrological structure and function and prevent any long-term barrier to fish movement within the catchment. Presenting a barrier to fish species movement could isolate important habitat that supports a critical life-cycle stage of Atlantic salmon or lamprey species (e.g. spawning grounds).

775. During trenchless excavation, bankside works (i.e. the launch and reception shafts for pipe jacking which would be situated outside of the riparian zone) may result in the severance of the bankside habitat used by otter, at least temporarily, during construction. Trenchless excavation would not result in a barrier effect to aquatic species such as lamprey and Atlantic salmon.

776. None of the watercourse crossings are within the boundaries of a European site (no direct effects), therefore any potential barrier effects are indirect.

5.2 Operational Phase

777. The Proposed Project has been designed to avoid potential Operational Phase impacts where possible. Details of this are provided in Section 3.5. A discussion of the resultant potential effects is provided below. In each case, the effects identified are prior to any further mitigation or control measures, if required.

778. With regard to the 38 kV Uprate Works, Operational Phase impacts would mainly be confined to occasional checks and maintenance of the existing structures, hardware and conductors and potential collision risks with OHLs. Maintenance would also include the ongoing maintenance vegetation trimming. Any impact from these works (e.g. worst-case scenario, replacement of existing structure) would be of a similar nature to those described above for the Construction Phase. To avoid repetition, they are therefore not repeated herein. However, it is noted that such works would be infrequent.

5.2.1 Hydrological Impacts during Operational Phase

779. Potential hydrological impacts associated with the Operational Phase of the Proposed Project are discussed herein, namely the RWI&PS (Section 5.2.1.1) and the Construction Working Width (Section 5.2.1.2). The WTP, BPT, BPS, FCV and TPR are discussed below.

780. The WTP is located within an area of agricultural land with no formal watercourses crossed. The closest mapped water body to the WTP is the Kilmastulla_050 (SC: 25_3881) which is located approximately 540m south of the site at its closest point and is part of the Lower River Shannon SAC. The WTP has been designed to be a closed system in that process waters would not be released to the environment and would instead be treated and retained. This would also be the case for any operational discharges to the Tank Draindown Management and Commissioning Lagoons during repair and maintenance. The WTP site (as distinct from the plant), is not a completely closed system. The section which is a closed system comprises the drainage from any roofs, all of which is captured to the same lagoons. The section that is not, is the drainage from other paved surfaces, which is first captured, and then attenuated in a pond, and finally discharged through a hydrocarbon interceptor, as a precaution against any possibility that such water may come in contact with a surface subject to a chemical spill. Ponds are designed to manage intense rainfall from a 100-year storm. Wastewater from the welfare facilities would be stored in a tank and disposed of to a licensed facility at intervals and the discharge of surface water would be via two settlement lagoons and to greenfield runoff rates. The WTP site is currently accessed by a privately owned unsurfaced track from the R496. It is proposed to construct a new permanent access road from the R445. The proposed access road would include the installation of box culverts within the floodplain of the Kilmastulla River, outside the boundary of the Lower River Shannon SAC. These would ensure that there is no obstruction to water flowing across the floodplain during the Operational Phase. The proposed access road to the WTP crosses the Knockadromin Stream (WCX002) approximately 35m upstream of its confluence with the Kilmastulla River and the Lower River Shannon SAC.

781. The BPT is located within an area of agricultural land with no formal watercourses crossed and there are no proposed discharges or outfalls from the site apart from surface water runoff, which would be discharged through dechlorination chambers and ultimately through soakaway chambers and a detention basin and allowed to soak to ground or run overland at a controlled rate so that flooding is avoided (EIAR Chapter 4: Proposed Project Description). The closest mapped water body to the BPT is the Ballyfinboy_040 (SC: 25_3690) which is located approximately 1.45km south-west of the site at its closest point. This water body is not designated as a European site. The closest European site is the Scohaboy (Sopwell) Bog SAC which is located approximately 1.8km north. The change in the land use under the footprint of the BPT could lead to changes in overland flow pathways; however, it is not considered that this would significantly affect the watercourses within the surrounding area as the

proposed site layout would include an infiltration basin which would be used for control of any surface water runoff. Therefore, it is not anticipated there would be any hydrological impacts during the Operational Phase as a result of the BPT.

782. The BPS site is located within a rural area of agricultural land adjacent to the L3003. The BPS paved areas are designed to incorporate SuDS principles to limit discharges from the site to the equivalent greenfield site flow rate. Surface water runoff from impermeable areas would be conveyed via an underground drainage system to a stormwater attenuation basin located to the front of the BPS site. The closest mapped water body to the BPS is the Camcor_030 (SC: 25_705) which is located adjacent to the BPS site, along its eastern boundary. This water body is not designated as a European site. Stormwater from the attenuation basin would be discharged at greenfield runoff rates via a 200mm diameter underground pipe to the Camcor_030. The change in the land use under the footprint of the BPS could lead to changes in overland flow pathways; however, it is not considered that this would significantly affect the watercourses within the surrounding area. Therefore, it is not anticipated there would be any hydrological impacts during the Operational Phase as a result of the BPS.

783. The FCV is located within an area of agricultural grassland surrounded by treelines. The closest mapped water body to the FCV is the Reeves_010 (SC: 09_2200) which is located approximately 632m north-west of the site. This water body is not designated as a European site. The appointed Contractor will construct temporary drainage measures to reduce the risk of pollution during earthworks construction and other elements of work. This will include the construction of an infiltration (soakaway) chamber and filter drains to disperse surface water in a controlled manner. The change in the land use under the footprint of the FCV could lead to changes in overland flow pathways; however, it is not considered that this would significantly affect the watercourses within the surrounding area. Therefore, it is not anticipated there would be any hydrological impacts during the Operational Phase as a result of the FCV.

784. The TPR is located within an area of arable land with no formal watercourses crossed. The closest water body to the TPR is the Liffey_180 (SC: 09_1131; Lucan Stream) which is located approximately 610m north-east of the site at its closest point. Surface water runoff at the TPR site would be drained into attenuation basins and then discharged at greenfield run-off rates via 200mm diameter underground pipework to the network of field ditches/drains located to the north and west of the site. Surface water runoff entering the attenuation basin would be pre-treated in a Class 2 By-Pass Hydrocarbon Interceptor. Therefore, it is not anticipated there would be any hydrological impacts during the Operational Phase as a result of the TPR.

5.2.1.1 Raw Water Intake and Pumping Station

5.2.1.1.1 Pre-Works and Post-Works Water Levels

785. A hydrological model and a water quality model of Lough Derg and Parteen Basin were constructed to simulate the existing relationship between Lake levels, flows, and water quality, to determine if the proposed abstraction would impact on the water level and water quality of Lough Derg and Parteen Basin. Model simulations used data obtained through monitoring work on Lough Derg and Parteen Basin. Full details of the models are provided in EIAR Appendix A9.1 Annex A (Hydrological Modelling Report) and EIAR Appendix A9.1 Annex B (Water Quality Modelling Report).

786. The hydrological model was used to assess the impact of the proposed abstraction on the water levels of Lough Derg and Parteen Basin and the forward flows released to the Old River Shannon. Two constant rates of abstraction have been investigated: i) 154Mld – taken to be representative of normal operation demand by the year 2050, and ii) 300Mld – projected peak need/demand at year 2050. The model was run using data from the period 1 January 1972 to 31 October 2023, allowing the simulation of daily levels and daily flows across this 52-year period with and without the proposed abstraction in place.

787. The impacts to Lake levels and forward flows to the Old River Shannon due to the modelled inclusion of the Proposed Project abstraction (as a constant flow of either 154Mld or 300Mld) were found to be barely distinguishable from the baseline case when viewed on level\flow duration curves (a standard hydrological method for comparing long-term data series).

788. The level regimes of both the Lough Derg and Parteen Basin Lake water bodies are only simulated to be notably affected by the inclusion of the Proposed Project during extreme drought periods and in the days immediately after the drought (up to a week) when Lake inflow is needed to replenish any deficit in storage caused by the Proposed Project abstraction. From the 52-year model simulation period (1972 to 2023), the simulated Lake levels are only found to be notably affected by the inclusion of the Proposed Project during the 1995 and 2018 drought events. Therefore, for approximately 99% of the 52-year model simulation period, there are no perceptible impacts to simulated Lake levels as a result of the Proposed Project.

789. Even during the worst modelled drought event (2018) from the 52-year model simulation period, the size and rate of simulated Lake level change fits within the range of ESB normal observed Lake level fluctuations seen within the 52-year period of historical recorded levels. Critically, the simulated Lake levels with the inclusion of the proposed WSP abstraction are still within the Normal Operating Band on Lough Derg and within the upper and lower water levels that ESB apply to Parteen Basin.

5.2.1.1.2 Climate Change

790. A version of the hydrological model has been run to investigate the likely impacts in the future when the Lake hydrology is subject to climate change. A precautionary approach to the consideration of climate change and a 'reasonable worst case' for the 2080s epoch has been used in the EIAR.

791. Two sources of climate change information regarding how Irish fluvial flows are projected to change were used and the results compared:

- The National University of Ireland (NUI) Maynooth (2008) report supplies river flow monthly change allowances for the 2080s epoch together with an indication of uncertainties for nine catchments across Ireland. The lower allowances were used to provide a reasonable worst-case scenario
- The ICARUS (2020) study supplies a means of selecting climate change allowances dependent on catchment characteristics for any location in Ireland.

792. Climate change simulations for a reasonable worst-case scenario for the 2080s epoch with the inclusion of the Proposed Project abstraction indicate that simulated Lake levels would draw down closer to the bottom of the Normal Operating Band during the 2018 drought – the most impactful drought event from the 52-year model simulation period (1972 to 2023). However, the additional simulated Lake level drawdown is still fitting within the range of ESB normal observed Lake level fluctuations, resulting in Lake levels still remaining within the Normal Operating Band on Lough Derg and within the upper and lower water levels that ESB applies to Parteen Basin, and would mean no change to the Old River Shannon compensation and fish pass flows always being met from the inclusion of the Proposed Project abstraction. For more details on the hydrological model climate change scenarios, see the EIAR Appendix A9.1 Annex A (Hydrological Modelling Report).

5.2.1.1.3 Headrace and Tailrace

793. The Proposed Project has been designed so that the primary day-to-day operational effect of the abstraction would be approximately 2% reduction in the volume of water passing from the Headrace into the Ardnacrusha Generating Station and onwards into the Tailrace. There would be no effect of this on the Headrace itself, rather there would be a reduction in time period over which the power station would operate. This is because the flow rates through the power station are fixed by the generator

characteristics and so, to bring about the reduction in volume required to accommodate the abstraction being proposed, a reduction in time operating must occur. In very simple terms, this means that if the flow down the Headrace was at 100m^3/s for 100 minutes in the baseline, post abstraction (assuming a 2% reduction in flow) this would reduce to 100m^3/s for 98 minutes.

794. In reality, much larger variations are currently managed by ESB and power generation is adapted to natural flow variations including droughts and floods at the extremes. The abstraction would represent itself at Ardnacrusha Generating Station as a slightly drier climate. As ESB manages much larger variations in flows without foresight (of long-term weather forecasts), it is expected in this assessment that ESB would be competent to adjust power generation to reflect the reduced volume available.

795. The flows passing through the power station enter the Tailrace before the confluence with the Old River Shannon. At the confluence the Old River Shannon is tidal; downstream river levels are not predicted to change perceptibly as a result of this reduction in volume, because the flow rate through the generators does not change, only the duration. Furthermore, the tidal influence in the Tailrace is expected to moderate any changes in levels due to the duration of operation being slightly reduced. However, some change in levels cannot be ruled out completely, especially at or near low tide. The magnitude of such changes is predicted to be negligible. For more details on the hydrological model Headrace and Tailrace scenarios, see the EIAR Appendix A9.1 Annex A (Hydrological Modelling Report).

796. When there is insufficient flow entering Parteen Basin to operate Ardnacrusha Generating Station 24 hours a day, the power generation is concentrated at times of peak energy demand. On such occasions there are prolonged periods (typically at night/off-peak) where no flow (except through the fish pass) is passing into the Tailrace. A review of available hourly discharge through Ardnacrusha Generating Station was undertaken (of available data from June 2015 to December 2016). On average, the station was in operation for approximately 16 hours a day during that period. There is a wide seasonal variability in this average value. For example, in July 2015 the power station operated approximately eight hours a day. When the power station is not in operation, a flow of just 0.7m^3/s enters the Tailrace via the fish pass. Therefore, in July 2015 the Tailrace received flows of just 0.7m^3/s for around 16 hours a day.

797. The abstraction would increase the amount of time the station is unable to operate to reflect the expected 2% reduction in volume. Given the periods of time where the station does not operate, and the annual and seasonal variability, the magnitude of impact on the Tailrace has been considered to be insignificant and negligible. The Tailrace is an Artificial Water Body, and its lower reaches are within the Lower River Shannon SAC.

5.2.1.1.4 Old River Shannon

798. There would be no effect on the compensatory flows to the Old River Shannon as the proposed abstraction is provided from the Lake storage and changes to the hydropower regime. During drought conditions, there would be no changes to the statutory compensation flows to the Old River Shannon as the abstraction would continue to take from the Lake storage. During flood conditions, when the ESB can no longer keep the water level below the top of the Normal Operating Band, ESB can operate Ardnacrusha at full capacity as they have done in the past, and the Proposed Project abstraction flow would be provided from a minor depletion in the simulated Lake storage.

799. The hydrological model demonstrates that forward flows to the Old River Shannon remain unchanged by the inclusion of the Proposed Project abstraction. The proportion of days (to the nearest whole percent) when the Old River Shannon is receiving just the compensation and fish pass flows remains the same as does the timing of the spills when Ardnacrusha is at full capacity.

800. In flood conditions, when the flow rates provide too much water for generating, the following should be noted:

- There is no fixed capacity of Ardnacrusha Generating Station, but it is typically between 340-400m^3/s. The capacity varies from day to day based on the gross head involved
- Generators pass more water at a lower gross head. Due to this, Parteen Basin tends to have quite low levels during floods which is contrary to what might be expected. For example, on 1 January 2016, during a flood event, Parteen Upper recorded a level of 30.01mAOD which is close to the Lower Lake Level that the ESB applies on Parteen Basin (30.86 to 30.00mAOD upper and lower lake levels for Parteen Basin). For context, this is a lower water level than experienced in the 1995 drought on Parteen Basin.

801. To maintain Parteen Weir at this level, all flow passed through Parteen Basin is either directed over Parteen Weir and/or passed through Ardnacrusha Generating Station. The gates at Parteen Weir are operated by ESB.

802. The hydrological model also demonstrated that with the abstraction in place the statutory 10m^3/s compensation flow over Parteen Weir could have been provided over the entire 52-year period (1972 to 2023) without interruption while maintaining the Normal Operating Band. This includes the most significant drought on record in 2018.

5.2.1.1.5 Summary

803. Throughout the 52 years analysed (1972 to 2023), the impacts to the Lough Derg and Parteen Basin Lake levels and forward flows to the Old River Shannon due to the modelled inclusion of the Proposed Project abstraction (as a constant flow of either 154Mld or 300Mld) are barely distinguishable from the baseline case when viewed on level/flow duration curves (a standard hydrological method for comparing long-term data series). The Lake level regimes are only simulated to be affected by the proposed abstraction during extreme drought periods (1995 and 2018) and in the days immediately after the drought (up to a week) when inflow is needed to replenish any deficit in storage caused by the Proposed Project. For approximately 99% of the 52-year model simulation period, there are no perceptible impacts to simulated Lake levels as a result of the proposed abstraction.

804. As previously noted, ESB will facilitate the proposed abstraction of water by the Proposed Project within its current operating practices. As part of an overall agreement with ESB, water will be diverted to the Proposed Project abstraction from the flow that would otherwise have been used for electricity generation on a continuous year-round basis. At a practical level, this will mean that ESB, in keeping the water level within the Normal Operating Band on Lough Derg and within the upper and lower water level on Parteen Basin, will take account of, and respond to, the volume of water abstracted for the Proposed Project, alongside other relevant considerations such as, maintaining statutory compensation flow of 10m^3/s down the old Shannon channel, predicted rainfall, the demand for power and operating practices. ESB will maintain the water levels within the Normal Operating Band on Lough Derg and within the upper and lower water levels on Parteen Basin, as it does currently. Over longer periods there would be a generalised adjustment of the flow going to Ardnacrusha by ESB to respond to the volume of water used by the Proposed Project. However, the operation of Lough Derg, post works, will feel and look very similar to the way it currently operates, and there will not be a visible day to day difference.

805. During flood flows, when the ESB can no longer keep the water level below the top of the Normal Operating Band, the ESB can operate Ardnacrusha at full capacity as they have done in the past, and the Proposed Project abstraction flow would be provided from Lake storage resulting in a lowering of the water level compared with baseline flood conditions.

806. In drought conditions, if the water flowing into Lough Derg reduces sufficiently, ESB will cease power generation, and the minimum statutory compensation and fish pass flows are prioritised over the use of water by Ardnacrusha. In these circumstances the abstraction by the Proposed Project would be provided from the Lake storage resulting in a lowering of the water level compared with the baseline drought conditions.

807. The simulated forward flows to the Old River Shannon remain unchanged by the inclusion of the Proposed Project abstraction. The proportion of days (to the nearest whole percent) when the Old River Shannon is receiving the minimum required compensation and fish pass flows is simulated to be unchanged by the inclusion of the Proposed Project abstraction, as does the timing of the spill flows down Old River Shannon when Ardnacrusha is at full capacity.

808. From the 52-year model simulation (1972 to 2023), the 2018 drought event shows the most notable impact to simulated Lake levels from the inclusion of the Proposed Project abstraction (at a constant 154Mld or 300Mld). However, even during the modelling of this worst drought event, the size and rate of the simulated Lake level changes fit within the range of ESB normal observed Lake level fluctuations seen within the 52-year period of historical recorded levels. Furthermore, the simulated Lake levels with the inclusion of the Proposed Project abstraction are still within the Normal Operating Band on Lough Derg and within the upper and lower water levels that ESB apply to Parteen Basin, and would mean no change to the Old River Shannon compensation and fish pass flows always being met.

809. Climate change simulations for a 'reasonable worst case' scenario for the 2080s epoch with the inclusion of the Proposed Project indicate that simulated Lake levels would draw down closer to the bottom of the Normal Operating Band during the 2018 worst drought event. However, the additional simulated Lake level drawdown is still fitting within the range of ESB normal observed Lake level fluctuations, resulting in Lake levels still remaining within the Normal Operating Band on Lough Derg and within the upper and lower water levels that ESB apply to Parteen Basin, and would mean no change to the Old River Shannon compensation and fish pass flows always being met from the inclusion of the Proposed Project abstraction.

810. The hydrological model demonstrates there would be no significant effect on water levels and the flow regime either upstream or downstream of the Proposed Project, therefore, the proposed abstraction is not anticipated to have any effect on the qualifying interest habitats or species of the Lower River Shannon SAC.

5.2.1.2 Construction Working Width

5.2.1.2.1 Washout Valves

811. During the Operational Phase of the Treated Water Pipeline, there would be no routine discharges from the Treated Water Pipeline to the surface water environment. Notwithstanding this, Washout Valves would be located along the pipeline. They would be used very rarely for repair and maintenance, as planned discharges are an infrequent occurrence and required typically only for planned repair and maintenance (50 years). There would be an initial visual inspection to examine the integrity of installed valves including seals, wherever possible, i.e. at chambers. Where a seal has failed the most likely event is to be a leak of the potable water which contains trace elements of chlorine. In the event that a repair is to be carried out, all plant and equipment arriving on-site would have to provide demonstrable evidence of being subject to a regular servicing schedule which should identify any issues with leakage of fuel/lubricants at seals. If possible, biodegradable oil would be used; biodegradable oil is less toxic than most synthetic oil but would still be used and stored to the same standards as other oils. All fuel and chemical storage areas would be stored away (i.e. not within 10m of a non-sensitive watercourse or within 50m of a sensitive watercourse) from watercourses and drainage paths. Planned repair and maintenance would only occur in low flow periods.

812. An initial investigation to identify potential watercourses to receive planned releases via the Washout Valves has been completed. There are 187 Washout Valves proposed along the Proposed Project (excluding the Washout Valves incorporated in the bypass pipework at each Line Valve installation; see EIAR Chapter 4: Proposed Project Description). Of these, 39 would have a permanent discharge to watercourses; 57 would require a temporary discharge to large watercourses; 51 would require temporary local discharge to small ditches and field drains; and 40 which would discharge locally over

land. The final number and location of Washout Valves would be confirmed during the detailed design phase of the Proposed Project; however, the location and number of Washout Valves presented within this NIS are considered to be the maximum, worst-case scenario. Where feasible, the pipeline design has strategically located Washout Valves close to watercourses, so that water can be discharged into a watercourse at a controlled rate when the pipeline is drained. The number of discharges from Washout Valves is dependent upon the topography and the capacity of the receiving streams to accept the discharge. An initial assessment of this capacity has restricted any single discharge to 20% of the associated stream's median annual flood flow rate (Qmed).

813. For the temporary discharge locations, water would be discharged into a nearby watercourse (including a large ditch or drain) at a controlled rate through temporary pipework (flexible hose). Table 5.13 summarises the location of the temporary outfalls. Potential impacts associated with the temporary discharges relate to chlorine in the water (i.e. dosing of low levels of chlorine between 0.1mg/l and 0.2mg/l into the final water, to prevent build-up of slime in the treated water pipe), or the discharge of large flows and volumes of water into local water bodies which could cause scour of the channel bed at the discharge point. None of the temporary outfalls are located within the boundaries of any European site; however, all have a hydrological pathway to one or more European sites. Of this list, the Kilmastulla River is the only watercourse partially designated as a European site (Lower River Shannon SAC). The proposed temporary discharge for this watercourse is located upstream of the Lower River Shannon SAC boundary. Considering none of the Temporary Discharge Locations are located within a European site, there would be no likely significant direct effects on the qualifying interests or special conservation interests of any European site as a result of the temporary discharges. The assessment of impacts and their potential to have indirect effects are considered in Section 7.

814. For the permanent discharge locations with permanent outfalls, a buried pipeline would connect the water supply pipeline to a fixed permanent outfall structure on the bankside of the watercourse. The connecting pipeline diameter would be determined during the detailed design for each specific location and the specific required maximum discharge rate at that location. However, it is anticipated that the pipe would be less than 500mm nominal diameter. The outfall structure would require the removal of the channel bed and banks locally, replacing this with hard reinforcement (likely concrete). The structure would also require the local removal of the riparian corridor, potentially destabilising the channel banks. Table 5.14 summarises the location of the permanent outfalls. None of the permanent outfalls are located within the boundaries of any European site; however (similar to the temporary discharges) all have a hydrological pathway to one or more European sites. Of this list, the Kilmastulla River is the only watercourse partially designated as a European site (Lower River Shannon SAC). The proposed permanent outfall for this watercourse is located upstream of the Lower River Shannon SAC boundary (EIAR Figure 8.1). Considering none of the permanent outfalls are located within a European site, there would be no likely significant direct effects on the qualifying interests or special conservation interests of any European site as a result of the permanent outfalls; however, the potential for indirect effects is considered in Section 7.

Table 5.13: Summary of Temporary Discharge Locations

Washout Valve ID	Watercourse Reference	Washout Valve Design Flow (l/s)	Approximate Chainage	Pathway to European Site
WB-001	Kilmastulla River	15	TW – 2260	2.3km from the Lower River Shannon SAC
WB-002	Kilmastulla River	15	TW – 3255	3.1km from the Lower River Shannon SAC
WB-002a	Small ditch/field drain	15	TW – 3520	3.4km from the Lower River Shannon SAC
WB-003	Large ditch/drain	15	TW – 4415	3.5km from the Lower River Shannon SAC
WB-004	Large ditch/drain	15	TW – 4945	3.2km from the Lower River Shannon SAC
WB-005	Small ditch/field drain	15	TW – 6620	3.5km from the Lower River Shannon SAC

Washout Valve ID	Watercourse Reference	Washout Valve Design Flow (l/s)	Approximate Chainage	Pathway to European Site
WB-006	Tributary to Kilmastulla River	20	TW – 6940	3.5km from the Lower River Shannon SAC
WB-007	Tributary to Kilmastulla River	15	TW – 8490	4.7km from the Lower River Shannon SAC
WB-007a	Tributary to Kilmastulla River	15	TW – 9000	8.5km from the Lower River Shannon SAC
WB-008	Tributary to Kilmastulla River	25	TW – 10165	5.9km from the Lower River Shannon SAC
WB-009	Ardgregane Stream	15	TW – 13030	5.2km from the Lough Derg (Shannon) SPA
WB-010	Kilcolman Stream	15	TW – 13795	6.3km from the Lough Derg (Shannon) SPA
WB-011	GS4	15	TW – 14270	Discharge over agricultural wet grassland, no pathway to European site
WB-012	Stream	25	TW – 17135	3.7km from the Lough Derg (Shannon) SPA
WB-012a	Tributary to Nenagh	15	TW – 17885	3.3km from the Lough Derg (Shannon) SPA
WB-012b	Small ditch/field drain	15	TW – 18255	3.4km from the Lough Derg (Shannon) SPA
WB-013	Monsea Stream	15	TW – 19145	3.9km from the Lough Derg (Shannon) SPA
WB-014	Large ditch/drain	15	TW – 20455	4.6km from the Lough Derg (Shannon) SPA
WB-014a	GA1	15	TW – 27080	Discharge over agricultural land, no pathway to European site
WB-015	GA1	15	TW – 29270	Discharge over agricultural land, no pathway to European site
WB-016	Large ditch/drain	20	TW – 31600	8.3km from Lough Derg, North-East Shore SAC
WB-017	GA1	15	TW – 32160	Discharge over agricultural land, no pathway to European site
WB-018	Small ditch/field drain	15	TW – 34210	10.8km from Lough Derg, North-East Shore SAC
WB-018a	Ballyfinboy	15	TW – 34750	11.3km from Lough Derg, North-East Shore SAC
WB-019	BC1	15	TWA – 690	Discharge over agricultural land, no pathway to European site
WB-020	Small ditch/field drain	15	TWA – 3545	8.2km from Sharavogue Bog SAC
WB-020a	Small ditch/field drain	15	TWA – 4025	4.0km from Sharavogue Bog SAC
WB-022	Small ditch/field drain	15	TWA – 8765	1.5km from Sharavogue Bog SAC
WB-022a	Large ditch/drain	15	TWA – 12110	2.5km from Sharavogue Bog SAC
WB-023	GA1	15	TWA – 14170	Discharge over agricultural land, no pathway to European site
WB-024	Small ditch/field drain	15	TWA – 14775	2.7km from Sharavogue Bog SAC
WB-025	Small ditch/field drain	15	TWA – 15305	2.9km from Sharavogue Bog SAC
WB-026	Small ditch/field drain	15	TWA – 15955	2.5km from Lisduff Fen SAC
WB-027	Rock River	20	TWA – 17545	11.1km from Lisduff Fen SAC
WB-028	Small ditch/field drain	15	TWA – 19370	7.7km from Dovegrove Callows SPA
WB-029	Small ditch/field drain	15	TWA – 20315	9.5km from Dovegrove Callows SPA
WB-030	Small ditch/field drain	15	TWA – 23215	7.7km from Dovegrove Callows SPA
WB-031	Tributary to Clareen Stream	15	TWA – 23800	8.1km from Dovegrove Callows SPA
WB-032	Clareen River	20	TWA – 24775	8.6km from Dovegrove Callows SPA
WB-033	Tributary to Camcor Stream	15	TWA – 25690	9.2km from Dovegrove Callows SPA
WB-034	Camcor River	20	TWA – 26085	9.5km from Dovegrove Callows SPA
WB-035	Unnamed Stream	20	TWA – 27155	9.5km from Dovegrove Callows SPA
WB-036	Large ditch/drain	30	TWB – 270	9.6km from Dovegrove Callows SPA
WB-036a	GA1	15	TWB - 1130	9.9km from Dovegrove Callows SPA

Washout Valve ID	Watercourse Reference	Washout Valve Design Flow (l/s)	Approximate Chainage	Pathway to European Site
WB-037*	Large ditch/drain	N/A	TWB – 1390	10.1km from Dovegrove Callows SPA
WB-038	GA1	15	TWB – 3490	Discharge over agricultural land, no pathway to European site
WB-039	Small ditch/field drain	15	TWB – 5850	16.7km from the Middle Shannon Callows SPA
WB-040	Unnamed Stream at Kyleboher	15	TWB – 6550	17.1km from the Middle Shannon Callows SPA
WB-041	Tributary to Silver River (Kilcormac)	15	TWB – 7770	17.6km from the Middle Shannon Callows SPA
WB-042	Small ditch/field drain	15	TWB – 9130	18.8km from the Middle Shannon Callows SPA
WB-043	Large ditch/drain	20	TWB – 10940	20.2km from the Middle Shannon Callows SPA
WB-044	Unconfirmed large ditch/drain	15	TWB – 14170	21.6km from the Middle Shannon Callows SPA
WB-045	Tributary to Silver River (Kilcormac)	15	TWB – 14740	21.7km from the Middle Shannon Callows SPA
WB-045a	Small ditch/field drain	15	TWB – 15260	22km from the Middle Shannon Callows SPA
WB-046	BC1	15	TWB – 15850	Discharge over agricultural/cultivated land, no pathway to European site
WB-047	GA1	15	TWB – 16600	Discharge over agricultural land, no pathway to European site
WB-048	BC1	15	TWB – 17740	Discharge over agricultural land, no pathway to European site
WB-049	Large ditch/drain	19	TWB – 19770	5.4km from Charleville Wood SAC
WB-050	Large ditch/drain	20	TWB – 20290	5.5km from Charleville Wood SAC
WB-051	Large ditch/drain	20	TWB – 21770	5.5km from Charleville Wood SAC
WB-052	Large ditch/drain	20	TWB – 22060	5.5km from Charleville Wood SAC
WB-053	Small ditch/field drain	15	TWB – 23310	4km from the River Barrow and River Nore SAC
WB-054	Small ditch/field drain	15	TWB – 23940	5.3km from Charleville Wood SAC
WB-055	GA1	15	TWB – 26240	Discharge over agricultural land, no pathway to European site
WB-056	GA1	15	TWB – 28050	Discharge over agricultural land, no pathway to European site
WB-057	Clodiagh River (Tullamore)	15	TWC – 970	3.3km from the River Barrow and River Nore SAC
WB-058	Large ditch/drain	15	TWC – 1180	6.8km from Charleville Wood SAC
WB-059*	Toberfin (Meelaghan) Stream	N/A	TWC – 3310	4.6km from the River Barrow and River Nore SAC
WB-060	Tributary to Meelaghan Stream	20	TWC – 4780	5.8km from the River Barrow and River Nore SAC
WB-061	Small ditch/field drain	15	TWC – 5190	9.2km from Charleville Wood SAC
WB-062	Tributary to Tullamore River	20	TWC – 5590	6.3km from the River Barrow and River Nore SAC
WB-063	Small ditch/field drain	15	TWC – 6930	10.8km from Charleville Wood SAC
WB-064	Tullamore River	20	TWC – 8875	9.1km from the River Barrow and River Nore SAC
WB-065	Tullamore River	20	TWC – 9680	12.9km from Charleville Wood SAC
WB-066	Large ditch/drain	15	TWC – 9985	13.1km from Charleville Wood SAC
WB-067	Small ditch/field drain	15	TWC – 11095	14.2km from Charleville Wood SAC
WB-068	Small ditch/field drain	15	TWC – 11865	11.8km from the River Barrow and River Nore SAC
WB-069	Small ditch/field drain	15	TWC – 12010	12.1km from the River Barrow and River Nore SAC

Washout Valve ID	Watercourse Reference	Washout Valve Design Flow (l/s)	Approximate Chainage	Pathway to European Site
WB-070	Rathfeston Stream	20	TWC – 12585	12.3km from the River Barrow and River Nore SAC
WB-071	PB4	15	TWC – 13240	8.3km from the Raheenmore Bog SAC
WB-072	PB4	15	TWC – 13485	12.8km from the River Barrow and River Nore SAC
WB-073	Clonad Stream	20	TWC – 13670	12.8km from the River Barrow and River Nore SAC
WB-074	Small ditch/field drain	15	TWC – 15725	12.9km from the River Barrow and River Nore SAC
WB-075	Large ditch/drain	20	TWC – 17635	14.2km from the River Barrow and River Nore SAC
WB-076	GA1	15	TWC – 18150	Discharge over agricultural land, no pathway to European site
WB-077	Small ditch/field drain	15	TWC – 19260	15km from the River Barrow and River Nore SAC
WB-078	Tributary to Esker Stream	20	TWC – 20570	15km from the River Barrow and River Nore SAC
WB-079	Esker Stream	20	TWC – 21120	14.8km from the River Barrow and River Nore SAC
WB-080	Esker Stream	15	TWC - 21320	14.7km from the River Barrow and River Nore SAC
WB-081	Esker Stream	15	TWC – 21675	14.8km from the River Barrow and River Nore SAC
WB-082	Large Ditch/Drain	20	TWC – 22805	15km from the River Barrow and River Nore SAC
WB-083	Small ditch/field drain	15	TWC – 23190	15.1km from the River Barrow and River Nore SAC
WB-084	Small ditch/field drain	15	TWC – 23670	15.3km from the River Barrow and River Nore SAC
WB-085	Small ditch/field drain	15	TWC – 24115	15.5km from the River Barrow and River Nore SAC
WB-086	Small ditch/field drain	15	TWD – 385	16km from the River Barrow and River Nore SAC
WB-087	Small ditch/field drain	15	TWD – 490	15.9km from the River Barrow and River Nore SAC
WB-088	BC1	15	TWD – 1080	Discharge over agricultural land, no pathway to European site
WB-089	Small ditch/field drain	Unknown	TWD – 2845	15.5km from the River Barrow and River Nore SAC
WB-091	Tributary to Figile River	15	TWD – 3520	15.5km from the River Barrow and River Nore SAC
WB-092	Figile River	15	TWD – 4615	15.4km from the River Barrow and River Nore SAC
WB-093	Figile River	15	TWD – 4890	3.5km from The Long Derries, Edenderry SAC
WB-094	Figile River	25	TWD – 5275	15km from the River Barrow and River Nore SAC
WB-095	Figile River	25	TWD – 5645	15.2km from the River Barrow and River Nore SAC
WB-096	Large ditch/drain	15	TWD – 5895	15.1km from the River Barrow and River Nore SAC
WB-097	Figile River	15	TWD – 6150	14.8km from the River Barrow and River Nore SAC
WB-098	Figile River	15	TWD – 6280	14.8km from the River Barrow and River Nore SAC
WB-099	PB4	15	TWD – 6685	Discharge over cutover bog, no pathway to European site
WB-100	PB4	15	TWD – 6915	Discharge over cutover bog, no pathway to European site
WB-101	PB4	15	TWD – 7125	Discharge over cutover bog, no pathway to European site
WB-102	PB4	15	TWD – 7430	Discharge over cutover bog, no pathway to European site
WB-103	Small ditch/field drain	15	TWD – 7875	14.5km from the River Barrow and River Nore SAC
WB-104	PB4	15	TWD – 12160	Discharge over cutover bog, no pathway to European site
WB-105	PB4	15	TWD – 12895	Discharge over cutover bog, no pathway to European site
WB-106	PB4	15	TWD – 14145	Discharge over cutover bog, no pathway to European site

Washout Valve ID	Watercourse Reference	Washout Valve Design Flow (l/s)	Approximate Chainage	Pathway to European Site
WB-107	Abbeylough River	15	TWD – 14410	19km from the River Barrow and River Nore SAC
WB-109	Small ditch/field drain	15	TWD – 15865	20.4km from the River Barrow and River Nore SAC
WB-110	Small ditch/field drain	15	TWD – 16585	20.1km from the River Barrow and River Nore SAC
WB-111	GA1	15	TWD – 17345	Discharge over agricultural land, no pathway to European site
WB-112	Small ditch/field drain	15	TWD – 17825	21.9km from the River Barrow and River Nore SAC
WB-113	GA1	15	TWD – 18690	Discharge over agricultural land, no pathway to European site
WB-114	WN7	15	TWD – 19360	Discharge over peat land and bog woodland, no pathway to European site
WB-115	WN7	15	TWD – 20325	Discharge over peat land and bog woodland, no pathway to European site
WB-116	PB4	15	TWD – 20755	Discharge over peat land, no pathway to European site
WB-117	Large ditch/drain	20	TWD – 21025	13.3km from the River Boyne and River Blackwater SAC
WB-118	WN7	15	TWD –21415	Discharge over bog woodland, no pathway to European site
WB-119	WN7	15	TWD – 22705	Discharge over bog woodland, no pathway to European site
WB-120	Large Ditch/Drain in Peatland	19	TWD – 23110	14.2km from the River Boyne and River Blackwater SAC
WB-121	PB4	15	TWD – 23395	Discharge over peat land, no pathway to European site
WB-122	Unnamed Stream	15	TWD – 24305	14.3km from the River Boyne and River Blackwater SAC
WB-123	Small ditch/field drain	15	TWD – 24705	16.7km from the River Boyne and River Blackwater SAC
WB-124	GA1	15	TWD – 25645	Discharge over agricultural land, no pathway to European site
WB-125	Small ditch/field drain	15	TWD – 26885	15.7km from the River Boyne and River Blackwater SAC
WB-128	WD4	15	TWD – 30400	Discharge over conifer plantation, no pathway to European site
WB-129	Small ditch/field drain	15	TWD – 31205	11.3km from the Rye Water Valley/Carton SAC
WB-130	Large ditch/drain	15	TWD – 31880	10.6km from the Rye Water Valley/Carton SAC
WB-131	Lyreen River	25	TWE – 715	8.1km from the Rye Water Valley/Carton SAC
WB-132	Baltracy tributary to Lyreen River	25	TWE – 1740	7.7km from the Rye Water Valley/Carton SAC
WB-133	Small ditch/field drain	15	TWE – 4365	7.3km from the Rye Water Valley/Carton SAC
WB-134	Small ditch/field drain	15	TWE – 5855	7.3km from the Rye Water Valley/Carton SAC
WB-135	BC1	15	TWE – 6390	Discharge over agricultural/cultivated land, no pathway to European site
WB-136	Small ditch/field drain	15	TWE – 8210	6.6km from the Rye Water Valley/Carton SAC
WB-136a	BC1	15	TWE – 8520	Discharge over agricultural/cultivated land, no pathway to European site
WB-137	Friarstown Stream	20	TWE – 10125	7.1km from the Rye Water Valley/Carton SAC
WB-138	GA1	15	TWE – 12325	Discharge over agricultural land, no pathway to European site

Washout Valve ID	Watercourse Reference	Washout Valve Design Flow (l/s)	Approximate Chainage	Pathway to European Site
WB-139	Unnamed Stream	15	TWE – 13945	5.9km from the Rye Water Valley/Carton SAC
WB-140	Small ditch/field drain	15	TWE – 14145	5.8km from the Rye Water Valley/Carton SAC
WB140a	GA1	15	TWE – 15360	Discharge over agricultural land, no pathway to European site

Note: Washout Valves WB-037 and WB-059 are not required as part of the draindown strategy and a design flow has not been calculated for these. These Washout Valves have been included as they offer flexibility to operators where there are long lengths of pipeline draining to Line Valve locations.

Table 5.14: Summary of Permanent Washout Valve Locations

Washout Valve ID	Watercourse Reference	Washout Valve Design Flow (l/s)	Approximate Chainage	Pathway to European Site
WA-001	Incha Beg	45*	TW – 760	795m from the Lower River Shannon SAC
WA-002	Knockadromin		TW – 960	1.3km from the Lower River Shannon SAC
WA-003	Kilmastulla	35	TW – 2620	2.6km from the Lower River Shannon SAC
WA-004	Kilmastulla	40	TW – 3415	3.3km from the Lower River Shannon SAC
WA-005	Burgesbeg	30	TW – 7520	4.1km from the Lower River Shannon SAC
WA-007	Cloghleigh	35	TW – 10560	6.1km from the lower River Shannon SAC
WA-008	Patrickswell	30	TW – 11450	6.6km from the Lower River Shannon SAC
WA-009	Ardgregane Stream	45	TW – 13490	5.7km from the Lough Derg (Shannon) SPA
WA-010	Ardgregane Stream	100	TW – 15665	4.5km from the Lough Derg (Shannon) SPA
WA-011	Ardgregane Stream	35	TW – 16455	4km from the Lough Derg (Shannon) SPA
WA-013	Nenagh	150	TW – 19500	4.2km from the Lough Derg (Shannon) SPA
WA-014	Ardcrony River	115	TW – 26465	4.2km from Lough Derg, North-East Shore SAC
WA-015	Shesheraghmore	60	TW – 30810	7.3km from Lough Derg, North-East Shore SAC
WA-017	Ballyfinboy	75	TW – 34970	11.5km from Lough Derg, North-East Shore SAC
WA-018	Derrinclare Stream	50	TWA – 4820	3.7km from Sharavogue Bog SAC
WA-019	Derrinclare Stream	40	TWA – 5575	3.1km from Sharavogue Bog SAC
WA-020	Shinrone	50	TWA – 7945	1.6km from Sharavogue Bog SAC
WA-021	Quakerstown	30	TWA – 9380	1.2km from Sharavogue Bog SAC
WA-022	Little Brosna	200	TWA – 12930	2.6km from Sharavogue Bog SAC
WA-023	Local drain	30	TWA – 21315	7km from Dovegrove Callows SPA
WA-024	Camcor	150	TWA – 27595	9.6km from Dovegrove Callows SPA
WA-025	Ditch	30	TWB – 10160	2km from Middle Shannon Callows SPA
WA-026	Silver (Kilcormac)	30	TWB – 12630	2.1km from Middle Shannon Callows SPA
WA-027	Clodiagh (Tullamore)	150	TWB – 24900	3.7km from the River Barrow and River Nore SAC
WA-028	Unnamed Meelaghans Tributary	30	TWC – 4950	5.9km from the River Barrow and River Nore SAC
WA-029	Daingean River	30	TWC – 18915	14.8km from the River Barrow and River Nore SAC
WA-030	Esker Stream	50	TWC – 20240	15km from the River Barrow and River Nore SAC
WA-031	Figile	30	TWD – 4185	15.4km from the River Barrow and River Nore SAC
WA-032	Figile	150	TWD – 8925	14.8km from the River Barrow and River Nore SAC
WA-033	Figile	50	TWD – 18145	22.4km from the River Barrow and River Nore SAC

Washout Valve ID	Watercourse Reference	Washout Valve Design Flow (l/s)	Approximate Chainage	Pathway to European Site
WA-034	Mulgeeth	60	TWD – 26415	16.6km from the River Boyne and River Blackwater SAC
WA-035	Aghafullim	100	TWD – 32725	9.7km from the Rye Water Valley/Carton SAC
WA-036	Clonshanbo	55	TWE – 2430	7.3km from the Rye Water Valley/Carton SAC
WA-037	Lyreen	30	TWE – 3585	7.4km from the Rye Water Valley/Carton SAC
WA-038	Ardrass Lower	50	TWE – 9105	7.0km from the Rye Water Valley/Carton SAC
WA-039	Liffey	150	TWE – 9825	7.1km from the Rye Water Valley/Carton SAC
WA-040	Reeves	75	TWE – 11415	7.3km from the Rye Water Valley/Carton SAC
WA-041	Derrycrib	150	TWD – 28520	16.6km from the River Boyne and River Blackwater SAC
WA-042	Longwood	80	TWD – 29125	16.8km from the River Boyne and River Blackwater SAC

5.2.1.2.2 Watercourse Crossings

815. For watercourses crossed by the trenchless technique, no Operational Phase impacts are anticipated. For watercourses crossed by open cut techniques, there is potential for a 'weak' point being created in the channel bed and banks and the cross-section becoming locally unstable. This could lead to erosion occurring around the reinstated made ground, potentially destabilising the channel banks and bed. As a result, there could be changes in the flow and sediment processes within the channel, albeit locally, which could alter downstream morphological features. The removal of the riparian vegetation along the banks to facilitate the works could also contribute to the destabilisation of the banks. Downstream European sites with a hydrological pathway from the Proposed Project and features of interest sensitive to changes to the aquatic environment are (Appendix J: Watercourse Crossings and Pathways to European Sites):

- Lower River Shannon SAC
- Lough Derg North-east Shore SAC
- Sharavogue Bog SAC
- Lisduff Fen SAC
- River Shannon Callows SAC
- River Barrow and River Nore SAC
- South Dublin Bay SAC
- River Boyne and River Blackwater SAC
- Rye Water Valley/Carton SAC
- Middle Shannon Callows SPA
- Lough Derg (Shannon) SPA
- Dovegrove Callows SPA
- South Dublin Bay and River Tolka Estuary SPA
- River Boyne and River Blackwater SPA
- River Shannon and River Fergus Estuaries SPA.

816. Of these sites, South Dublin Bay SAC, and South Dublin Bay and River Tolka Estuary SPA were found to have no potential to be significantly affected by the Proposed Project due to their distance from it, the nature of the Proposed Project, and their qualifying interests; therefore, they were not considered further. Over time, and in the absence of control, prevention, or mitigation, changes in the morphology of rivers/streams crossed by the open-cut techniques could have a significant effect on the remaining downstream European sites with features of interest sensitive to changes to the aquatic environment.

5.2.2 Introduction or Spread of Invasive Non-Native Species

817. There is potential for zebra mussels in Parteen Basin to attach to the inside of intake pipes and other pipework beyond the intake, which could lead to a 'clogging' of the pipes and could stop the abstraction process. The attachment of zebra mussels to the pipework could also have a significant effect on other water bodies/catchments. To prevent this clogging and the potential spread of zebra mussel, the proposed design (Section 3.3 and Section 3.5) includes three Inlet Chambers, each fitted with a PWWC Intake Screen, to prevent debris or fish (including eels), being taken up in to the raw water pumps. Water would be drawn into the Pumping Station through the screens and into three separate but interconnected Inlet Chambers. Whilst it is proposed that the Passive Intake Screens would be manufactured in a copper nickel alloy material to minimise the risk of zebra mussel attachment, some proactive anti-fouling measures could also be needed to protect the intake pipes from becoming clogged. Internal coating of the pipes would be undertaken to discourage attachment of zebra mussel to the pipe wall. The anti-fouling measures would be non-toxic internal coatings on pipework, and manufacture in copper-nickel alloy (with space provision for permanganate dosing into the raw water flow in the RWRMs, if necessary). These are discouragers to adhesion, or treatment of the raw water flow after intake. None of these measures would have any effect on any waters.

818. As mentioned in Section 3.5.7, microfilters to prevent the transfer of zebra mussels from Parteen Basin would sit on a manifold located on a loop off the RWRM. Raw water would pass through these units and dirt particles and juvenile mussels would become trapped in the unit, forming a 'filtration cake'. This cake would cause a pressure differential across the unit and, at a predetermined pressure loss, a self-cleaning process would be triggered. When in use, the units would be flushed regularly to clean away any zebra mussels or other waste material trapped in the filters. A filter flush out pipe would carry the washwater to an INNS debris retention tank, located above the RWRMs Scour Tank at the northern side of the RWI&PS. The debris would be allowed to settle out in this tank before being removed for disposal off-site. No wastewater would be discharged as a result of this process; a floating arm draw off pipe would take supernatant liquid from the tank. This liquid would be passed through a UV treatment unit to deactivate any zebra mussel juveniles (veligers) before being returned to the passive screen inlet basin and being pumped back into the RWRM. With these design measures in place, there is minimal risk that operational activities in Parteen Basin have the potential to spread INNS.

819. Invasive non-native species have been recorded within or in close proximity to the Proposed Project (Section 4.3.1.2 and Section 4.3.7.2). Therefore, routine repair and maintenance works have the potential to accidently cause their instruction or spread to areas within European sites downstream of the Proposed Project. This has the potential to have long-term effects on species composition, diversity and abundance in affected areas.

5.2.3 Disturbance/Displacement

5.2.3.1 Otter

820. When fully developed and operational, it is expected up to 32 staff would be required to operate and maintain the WTP and the RWI&PS. Staff numbers are intended as indicative full time equivalent personnel and would be based at the WTP site. It should be noted, suitable otter habitat and signs of otter were recorded at the RWI&PS, however, no signs or suitable habitat were recorded at the WTP site. Therefore, no disturbance/displacement effects on otter are anticipated at the WTP site during the

Operational Phase of the Proposed Project. There would, however, be a level of disturbance associated with human activity and noise during the Operational Phase, to otter potentially using the shoreline habitat adjacent to the RWI&PS. There would also be some artificial security lighting associated with the RWI&PS. However, this would be minimal and overspill of light will be minimised through directional lighting as per design standards (Chartered Institution of Building Services Engineers 2016; Commission Internationale de l'Eclairage 2017; Bat Conservation Trust 2023) (i.e. aimed directly onto the site and not the wider landscape) so as to leave the areas outside of the footprint of the RWI&PS unilluminated. This will be done through the use of cowls, lighting hoods, or louvres fitted to the rear of luminaires (light fixtures), and/or shields to direct light in a downward and inward fashion to intended areas only. Otters are generally nocturnal in habit and therefore, would not be affected by activity during normal daylight working hours. Furthermore, otter are known to tolerate human disturbance under certain circumstances (Reid *et al.* 2013) as evidenced by the presence of otter signs around Parteen Basin near Parteen Weir which already experiences human activity and has some existing lighting; and the species would be expected to become habituated to the presence of operational activities. Thus, impacts due to increased human activity, noise and/or lighting associated with the RWI&PS during the Operational Phase are unlikely to result in any significant disturbance/displacement effects to otter.

821. Staffing for the Treated Water Pipeline operation would be small compared to the staffing levels required for the WTP and RWI&PS. It is, however, expected there would be a small team to look after the pipeline valves, BPT, BPS and flow control valves. The Treated Water Pipeline staff would likely be based at existing Uisce Éireann depots convenient to the pipeline route. The pipeline route would be traversed and all valves and storages would be inspected at six-monthly intervals to check security, valve operation and to ensure no leaks are apparent. The inspection would be carried out in a small van and where necessary on foot and would require means of access to the land in agreement with landowners. There is an existing reservoir facility at Peamount and it is envisaged that the staff currently managing that site would also be responsible for the proposed TPR, i.e. additional staff would not be required at this location. Thus, any increased level of disturbance associated with the Operational Phase of the Treated Water Pipeline, as well as the BPT, BPS, FCV and TPR, would be minimal and infrequent and therefore unlikely to result in any significant disturbance/displacement of otter from their habitat.

5.2.3.2 Atlantic Salmon, Sea Lamprey, Brook Lamprey, and River Lamprey

822. During the Operational Phase, the RWI&PS is the only element of the Proposed Project that could have any likely significant disturbance/displacement effects on Atlantic salmon or lamprey qualifying interest species. It is proposed to construct an Intake Chamber with three PWWC Intake Screens, to minimise debris and/or fish or eels being taken up into the raw water pumps during the Operational Phase. The screens will be selected so that intake velocities through the screen slots are limited to 0.15m/s, the velocity at which juvenile fish that are known to occur in Parteen Basin can swim away without being trapped/held against the screen, taking into consideration average water temperatures (Department of Communications, Marine and Natural Resources 2005). A bubble curtain would also be provided at the inlet to the chamber housing the PWWC Intake Screens. The bubble curtain is a system that produces fine bubbles of air across the entrance to the intake structure, which act as a barrier (a curtain) further discouraging fish from entering the intake. The bubble curtain would require cleaning and maintenance as per the manufacturer's specifications to ensure it continues to operate effectively; and would be replaced if it ceases to function correctly. Thus, there would be no likely significant disturbance/displacement impacts on aquatic fauna in Parteen Basin during the Operational Phase of the Proposed Project. The Proposed Project would not result in any long-term disturbance or displacement of Atlantic salmon, brook lamprey, river lamprey or sea lamprey species during the Operational Phase and is unlikely to have any effect on the populations of these qualifying interest species in the Lower River Shannon SAC.

5.2.3.3 Bird Species of Conservation Concern

823. Increased human presence, noise, and lighting associated with the Operational Phase of the Proposed Project (e.g. general repair and maintenance and inspections) have the potential to temporarily disturb, and potentially displace, birds from important habitat areas. This applies to supporting habitat areas only, remote from SPA sites, as there are no SPA sites located close enough to the Proposed Project to experience these potential effects directly.

824. The pipeline, including Line Valves, Washout Valves and Air Valves, once constructed, would not generate any significant noise during the Operational Phase. There would be no operational plant items associated with the BPT and TPR that would give rise to any significant noise emissions to the surrounding environment. Similarly, any plant operational within the FCV likely to emit noise will be housed underground and would not give rise to significant noise emissions to the surrounding environment (EIAR Chapter 6: Noise & Vibration). Thus, any increased level of disturbance associated with these elements of the Proposed Project during the Operational Phase would be minimal and infrequent and therefore would not result in likely significant effects on any European site, in particular ex-situ habitats remote from SPA sites within the ZoI of the Proposed Project.

825. The three remaining infrastructure sites within the Proposed Project (i.e. RWI&PS, WTP and BPS) have the potential to generate significant noise during the Operational Phase (EIAR Chapter 6: Noise & Vibration). This is due to mechanical plant items that would be required to serve the processes carried out within each site. However, no important habitat areas for Annex I birds were recorded within the ZoI of these sites. While special conservation interest species of the Lough Derg (Shannon) SPA have been recorded in Parteen Basin, none of these species were recorded using habitat in the footprint of the RWI&PS. The majority of observations were of birds using the western (more natural) side of Parteen Basin rather than the eastern (man-made) embankment, where the RWI&PS is located. Therefore, there is no potential for likely significant disturbance/displacement effects during the Operational Phase for any European sites, particularly SPAs within the ZoI of the Proposed Project.

5.2.4 Pollution Risk

826. During the Operational Phase, there are potential sources of water quality contamination from the RWI&PS. Rainfall runoff from roads and impermeable areas would be conveyed via a drainage system to a Stormwater Attenuation Tank. An oil interceptor would be located immediately upstream of the attenuation tank. A flow control device on the outlet of the tank would limit discharge stormwater flow leaving the tank to a maximum of 17.35l/s, equivalent to the greenfield runoff from the entire RWI&PS site. Flow from the attenuation tank would be conveyed by a 225mm diameter drain along the RWI&PS access road to a local drainage ditch (WBX002). Drainage from the new access road to the RWI&PS site from the R494 would be captured by a concrete kerb and conveyed to a filter drain on each side of the road. The filter drain would discharge to the existing watercourse (WBX002) which crosses the access track approximately 350m along the access track from the R494. On the RWI&PS site itself, rainwater from the roofs of the Raw Water Pumping Station Building and the two Microfiltration Buildings would be harvested and re-used on site. The site would not be manned and so foul wastewater generated by operational staff on the site is estimated at less than $1m^3/d$ and would be tankered from the Wastewater Holding Tank to a licensed Wastewater Treatment Plant. Further details of this are provided in EIAR Chapter 4 (Proposed Project Description). The net result is that there would be no likely significant effects on water quality from the RWI&PS during the Operational Phase, and thus no likely significant effects on European sites.

827. Provision has been made to allow each of the twin RWRMs to be emptied to a 2,600m^3 capacity RWRM Scour Tank at the RWI&PS. The RWRM Scour Tank would be located to the side of the Pumping Station and would drain back to the Inlet Chambers for re-pumping to the WTP. This system would allow the RWRM to be emptied for repair and maintenance or in an emergency without having to discharge any water back to Parteen Basin. The RWI&PS would be a 'closed loop system'. There would be no discharge of pipeline repair and maintenance water from the RWI&PS back to Parteen Basin. This ability to effectively 'switch off' one of the two RWRM would also be important in the control of zebra mussels and reducing the potential for them to be transferred further; chemical treatment of the mussels and their veligers with chlorine is not always effective as mussels could survive for two weeks by closing down filtration in a hostile environment. The closed RWRM can be isolated for longer than two weeks, thus enabling the chemical treatment of any remaining mussels in the system prior to the water entering the microfiltration module (Section 3.5.7). A programme of preventative maintenance would determine the frequency of this.

828. There would be no wastewater from welfare facilities discharged; it would be contained and removed, to an authorised facility or for recovery, by tanker at appropriate intervals.

829. Overall, the risk of pollution impacts during the Operational Phase of the Proposed Project would have no likely significant effects on any European site.

5.2.5 Mortality Risk

830. It is proposed to provide three Raw Water Intake points, each fitted with a PWWC Intake Screen, to prevent debris and/or fish being taken up into the raw water pumps during the Operational Phase. The screens would be selected so that intake velocities through the screen slots are limited to 0.15m/s, the velocity at which juvenile fish that are known to occur in Parteen Basin can swim away without being trapped against the screen, taking into consideration average water temperatures (Department of Communications, Marine and Natural Resources 2005). Thus, mortality or injury as a result of the raw water pumps during the Operational Phase of the Proposed Project is unlikely to have any effect on the populations of qualifying interest species of the Lower River Shannon SAC.

831. The existing fish pass at Parteen Weir does not accommodate elvers or lamprey species (ESB operates a trap and transport programme for migrating silver eel (ESB n.d.) and upstream migrant adult salmon in the Old River Shannon channel are known to struggle to find the pass. This has led to a Steering Group being set up to improve fish migration at Parteen and Ardnacrusha in the Lower River Shannon Catchment (Department of Housing, Planning and Local Government 2018). In addition, very few downstream migrant fish are likely to find the entrance point of the existing salmon pass. Most swim towards the Headrace and through the turbines which often results in mortality, and some fish cross the spillways into the Old River Shannon. The Proposed Project would not, however, alter the existing scenario (nor would it impede the ability to improve fish passage in the Lower Shannon catchment; as per the objectives of the CDM Smith (2021) study), therefore, there is no risk of mortality to aquatic fauna in Parteen Basin during the Operational Phase as a result of the Proposed Project itself.

5.2.6 Collision Risk

832. The Lough Derg (Shannon) SPA is located approximately 5.7km upstream of the proposed 38 kV Uprate Works, while the River Shannon and River Fergus Estuaries SPA is located 6km downstream. Lough Derg and the Shannon Estuary are of importance for both breeding and wintering birds which supports nationally important breeding colonies for common tern and cormorant. While the proposed 38 kV Uprate Works is outside the core foraging range for most of these species, it should be noted that the maximum foraging range for cormorant is 50km (NPWS 2012b). The Lower River Shannon and Headrace Canal are used by species such as cormorant as commuting corridors between Shannon Estuary, Parteen Basin and Lough Derg (Shannon) SPA.

833. Birds in flight may collide with conductors or earth wires of power lines. Collisions occur when birds cross transmission lines during flights, when moving from roosting to feeding areas, when juveniles leave the nest site, and when birds move through an area. Rain, fog, darkness and other low visibility conditions can contribute to a higher collision risk. Body size, manoeuvrability and the height at which birds fly, may also contribute to collision risk. Swans and geese are all large aquatic birds with high vulnerability to collision. The vulnerability of raptors is thought to result from the birds pursuing prey at high speeds.

834. Based on the long-term existence of the line at its current location (approximately 70 years), with no known records of collisions to date, it is considered unlikely that the risk of collision as a result of the 38 kV Uprate Works would have significant effects on the special conservation interests species of the Lough Derg (Shannon) SPA or the River Shannon and River Fergus Estuaries SPA. The fitting of bird flight diverters across the Lower River Shannon SAC and the Headrace Canal between polesets 64B to 67B would further reduce the likelihood of avian collisions.

6. Identifying European Sites within the Zone of Influence of the Proposed Project

6.1 Identifying Relevant European Sites within the Zone Influence of the Proposed Project

835. In establishing which European sites are potentially at risk (in the absence of mitigation) from the Proposed Project, a source-pathway-receptor approach was applied. In order for an impact to occur, there must be a risk enabled by having a source (e.g. water abstraction or construction works), a receptor (e.g. a European site or its qualifying interests or special conservation interest species), and a pathway between the source and the receptor (e.g. pathway by air for noise or air pollution, or a pathway by a watercourse for mobilisation of pollution). For an impact to occur, all three elements must exist; the absence or removal of one of the elements means there is no possibility for the impact to occur.

836. The identification of a source-pathway-receptor risk does not automatically mean that significant effects would arise. The likelihood for significant effects would depend upon the characteristics of the source (e.g. extent and duration of construction works), the characteristics of the pathway (e.g. direction and strength of prevailing winds for airborne pollution) and the characteristics of the receptor (e.g. the sensitivities of the European site and its qualifying interests/special conservation interest species). However, identification of the risk does mean that there is a possibility of likely significant effects in the form of ecological or environmental damage occurring, with the significance of the effect depending upon the nature and exposure to the risk and the characteristics of the receptor. In this case, where uncertainty existed, the precautionary principle was applied.

837. There are 78 European sites located within the potential ZoI of the Proposed Project (i.e. European sites downstream of the Proposed Project, within the same groundwater body as the Proposed Project, or having another potential pathway for other types of effects) that were assessed in order to determine the actual ZoI and whether or not a source-pathway-receptor exists (Table 6.1). Of the 78, 19 are considered to have a source-pathway-receptor to the Proposed Project (Table 6.1). As discussed in Section 3, the Proposed Project crosses only one of these, namely the Lower River Shannon SAC. Examples of relevant pathways include, but are not limited to: surface water, groundwater, disturbance (visual, noise, physical presence) and loss of habitat (including supporting habitat). Table 6.1 outlines the qualifying interests and special conservation interest species for each European site and identifies where there are potential source-pathway-receptor links via which likely significant effects on the European sites' qualifying interests and special conservation interest species could potentially occur in light of their conservation objectives.

Table 6.1: Identifying Potential for Likely Significant Effects on European Sites

European Site	Statutory Instrument (S.I.) / Conservation Objectives (CO) Version	Approximate Distances (km) from the Proposed Project Boundary to the European Site Boundary					Qualifying Interest(s)/Special Conservation Interest Species	Description of Potential for Likely Significant Effects from the Proposed Project (alone or in-combination, where relevant)	Possibility of Likely Significant Effects
		0-1km	1-5km	5-10km	10-15km	> 15km			
Lower River Shannon SAC [002165]	S.I. No. 328/2023/ CO Version 1.0 (7 August 2012)	0km					Sandbanks which are slightly covered by sea water all the time [1110] Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons* [1150] Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Watercourses of plain to montane levels with the *Ranunculion fluitantis and Callitricho-Batrachion* vegetation [3260] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)* [91E0] Freshwater pearl mussel (*Margaritifera margaritifera*) [1029] Sea lamprey (*Petromyzon marinus*) [1095] Brook lamprey (*Lampetra planeri*) [1096] River lamprey (*Lampetra fluviatilis*) [1099] Salmon (*Salmo salar*) [1106] Common bottlenose dolphin (*Tursiops truncatus*) [1349] Otter (*Lutra lutra*) [1355]	The proposed RWI&PS and 38 kV Uprate Works are located within the boundaries of this SAC. Potential for direct, indirect, and in-combination impacts (habitat loss and fragmentation, habitat degradation, disturbance/displacement and mortality risks) on qualifying interests and supporting habitats exist, and therefore there is a possibility of likely significant effects alone and/or in-combination with other plans or projects.	Yes
Lisduff Fen SAC [002147]	S.I. No. 186/2016/ CO Version 1.0 (17 January 2019)	0.4km west					Petrifying springs with tufa formation (*Cratoneurion*)* [7220] Alkaline fens [7230] Geyer's whorl snail (*Vertigo geyeri*) [1013]	This SAC is located 490m as the crow flies and downstream of the Proposed Project. Surface water and groundwater pathways exist. Proposed Construction Phase and Operational Phase activities could lead to habitat degradation as a result of hydrological/hydrogeological effects, and therefore there is a possibility of likely significant effects alone and/or in-combination with other plans or projects.	Yes
Clonaslee Eskers and Derry Bog SAC [000859]	S.I. 162/2022/ CO Version 1.0 (7 February 2019)	1km south					Alkaline fens [7230] Geyer's whorl snail (*Vertigo geyeri*) [1013]	This SAC is located 1km and upstream of the Proposed Project. No surface water pathway exists. The indicative area of alkaline fen in Clonaslee Eskers and Derry Bog SAC is approximately 5.7ha. This habitat and Geyer's whorl snail are found to the east of the R421, approximately 3.5km south of the Proposed Project. The best example of the alkaline fen habitat occurs where calcareous springs occur in the fen at the base of the esker ridges. Due to the position of the SAC to the south of Ballincarrig/Derry Hills streams, underlying low permeability soils/geology within the Proposed Project, short excavation period for the pipeline (approximately 24 months between the initial occupation of the land and subsequent 'hand back' subject to any seasonal constraints for reinstatement), and distance between the Proposed Project and the SAC, it is considered that no source-pathway-receptor exists for effects as a result of the Proposed Project. This SAC is crossed by the proposed Haul Roads. All proposed Haul Roads traverse through European sites along existing roads only and are built land. Potential risks associated with indirectly introducing/spreading INNS via contaminated soil/material on construction traffic were considered. The spread/introduction of INNS as a result of construction traffic leaving the Proposed Project and travelling away from site along the proposed Haul Roads will be avoided by the inclusion of standard best practice features (i.e. vehicular wheel wash down facilities adjacent to site entrances/exits) within the Proposed Project. Thus, it has been determined there is no potential that construction traffic movement along the Haul Roads to and from the Proposed Project will introduce/spread INNS to the Clonaslee Eskers and Derry Bog SAC. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no source-pathway-receptor)
Island Fen SAC [002236]	S.I. No. 187/2016/ CO Version 1.0 (18 October 2018)		1.2km south				*Juniperus communis* formations on heaths or calcareous grasslands [5130] Alkaline fens [7230]	This SAC is located 1.2km and upstream of the Proposed Project. No surface water or groundwater pathways exist as Island Fen SAC is located 1.2km upgradient of the Proposed Project and is separated by different geological formations. There is therefore no pathway for effects as a result of the Proposed Project.	No potential for effects (no pathway)
Scohaboy (Sopwell) Bog SAC [002206]	S.I. 735/2022/ CO Version 1.0 (19 July 2023)		1.8km north				Degraded raised bogs still capable of natural regeneration [7120]	This SAC is located 1.8km from the Proposed Project. It is located downstream in the same river sub-catchment as the Proposed Project; however, no surface water pathways exist. The surrounding bog is drained, and the overall area is not intact. Possible groundwater pathways exist; however, this site does not have associated GWDTE such as groundwater flushes intact lagg zones, therefore it is considered that no source-pathway-receptor exists for effects as a result of the Proposed Project.	No potential for effects (no source-pathway-receptor)

European Site	Statutory Instrument (S.I.) / Conservation Objectives (CO) Version	Approximate Distances (km) from the Proposed Project Boundary to the European Site Boundary					Qualifying Interest(s)/Special Conservation Interest Species	Description of Potential for Likely Significant Effects from the Proposed Project (alone or in-combination, where relevant)	Possibility of Likely Significant Effects
		0-1km	1-5km	5-10km	10-15km	> 15km			
Silvermines Mountains West SAC [002258]	S.I. No. 146/2017/ CO Version 1.0 (10 November 2017)		1.7km south				Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Calaminarian grasslands of the *Violetalia calaminariae* [6130]	This SAC is located upstream and in an elevated position 1.7km from the Proposed Project. There is therefore no pathway for effects as a result of the Proposed Project.	No potential for effects (no pathway)
The Long Derries, Edenderry SAC [000925]	S.I. No. 528/2016/ CO Version 1.0 (11 November 2021)		1.9km north-west				Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites) [6210]	This SAC is located 1.9km and upstream of the Proposed Project. No surface water or groundwater pathways exist as The Long Derries and Edenderry SAC is upstream of the Proposed Project and is an isolated gravel ridge surrounded by cutover peatland, which is located above the surrounding landscape and is not in hydrogeological connection with the Proposed Project. There is therefore no pathway for effects as a result of the Proposed Project.	No potential for effects (no pathway)
Sharavogue Bog SAC [000585]	S.I. No. 225/2017/ CO Version 1.0 (2 November 2015)		2km north				Active raised bogs* [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150]	This SAC is located 2km as the crow flies and downstream of the Proposed Project. Surface water and possible groundwater pathways exist. Proposed Construction Phase and Operational Phase activities could lead to habitat degradation as a result of hydrological/hydrogeological effects associated with the Proposed Project, alone and/or in-combination with other plans or projects.	Yes
River Barrow and River Nore SAC [002162]	S.I. No. 648/2024/ CO Version 2 (6th June 2025)		2.5km south				Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Reefs [1170] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] European dry heaths [4030] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] Petrifying springs with tufa formation (*Cratoneurion*)* [7220] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)* [91E0] Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016] Freshwater pearl mussel (*Margaritifera margaritifera*) [1029] White-clawed crayfish (*Austropotamobius pallipes*) [1092] Sea lamprey (*Petromyzon marinus*) [1095] Brook lamprey (*Lampetra planeri*) [1096] River lamprey (*Lampetra fluviatilis*) [1099] Twaite shad (*Alosa fallax*) [1103] Salmon (*Salmo salar*) [1106] Otter (*Lutra lutra*) [1355] Killarney fern (*Trichomanes speciosum*) [1421]	At its nearest point, this SAC is located 2.5km from the Proposed Project. No surface water or groundwater pathways exist at this point. However, surface water pathways do exist along the route of the pipeline – this SAC is located 12.8km downstream of the pipeline at its closest connection. Proposed Construction Phase and Operational Phase activities could lead to habitat degradation as a result of hydrological effects and/or the spread of INNS associated with the Proposed Project, alone and/or in-combination with other plans or projects. This SAC is crossed by the proposed Haul Roads. All proposed Haul Roads traverse through European sites along existing roads only and are built land. Potential risks associated with indirectly introducing/spreading INNS via contaminated soil/material on construction traffic were considered. The spread/introduction of INNS as a result of construction traffic leaving the Proposed Project and travelling away from site along the proposed Haul Roads will be avoided by the inclusion of standard best practice features (i.e. vehicular wheel wash down facilities adjacent to site entrances/exits) within the Proposed Project. Thus, it has been determined there is no potential that construction traffic movement along the Haul Roads to and from the Proposed Project will introduce/spread INNS to the River Barrow and River Nore SAC. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	Yes
Lough Derg, North-east Shore SAC [002241]	S.I. No. 74/2018/ CO Version 1.0 (24 April 2019)		3.7km north				*Juniperus communis* formations on heaths or calcareous grasslands [5130] Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae** [7210] Alkaline fens [7230] Limestone pavements* [8240] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)* [91E0] *Taxus baccata* woods of the British Isles* [91J0]	This SAC is located 3.7km north of the Proposed Project at its closest point. It is downstream of the following watercourses crossed by the pipeline; Ardcrony Stream (WCX018), Shesheraghmore Stream (WCX019), and Ballyfinboy River (WCX020 and WCX021). Surface water and groundwater pathways exist. It is also located within the hydrological ZoI for the RWI&PS, i.e. Lough Derg is hydraulically connected immediately upstream of Parteen Basin. Its water levels are controlled by the same operating regime as Parteen Basin. Proposed Construction Phase and Operational Phase activities could lead to habitat degradation as a result of hydrological/hydrogeological effects associated with the Proposed Project, alone and/or in-combination with other plans or projects. This SAC is crossed by the proposed Haul Roads. All proposed Haul Roads traverse through European sites along existing roads only and are built land. Potential risks associated with indirectly introducing/spreading INNS via contaminated soil/material on construction traffic were considered. The spread/introduction of INNS as a result of construction traffic leaving the Proposed Project and travelling away from site along the proposed Haul Roads will be avoided by the inclusion of standard best practice features (i.e. vehicular wheel wash down facilities adjacent to site entrances/exits) within the Proposed Project. Thus, it has been determined there is no potential that construction traffic movement along the Haul Roads to and from the Proposed Project will introduce/spread INNS to the Lough Derg, North-east Shore SAC. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	Yes

European Site	Statutory Instrument (S.I.) / Conservation Objectives (CO) Version	Approximate Distances (km) from the Proposed Project Boundary to the European Site Boundary					Qualifying Interest(s)/Special Conservation Interest Species	Description of Potential for Likely Significant Effects from the Proposed Project (alone or in-combination, where relevant)	Possibility of Likely Significant Effects
		0-1km	1-5km	5-10km	10-15km	> 15km			
Rye Water Valley/Carton SAC [001398]	S.I. No. 494/2018/ CO Version 1.0 (22 December 2021)		4.5km north				Petrifying springs with tufa formation (*Cratoneurion*)* [7220] Narrow-mouthed whorl snail (*Vertigo angustior*) [1014] Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016]	This SAC is located 4.5km as the crow flies and downstream of the Proposed Project. Surface water pathways exist. Proposed Construction Phase and Operational Phase activities could lead to habitat degradation as a result of hydrological effects associated with the Proposed Project, alone and/or in-combination with other plans or projects.	Yes
Ballynafagh Lake SAC [001387]	S.I. No. 493/2018/ CO Version 1.0 (10 December 2021)		4.6km south				Alkaline fens [7230] Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016] Marsh fritillary (*Euphydryas aurinia*) [1065]	This SAC is located in a separate river sub-catchment 4.6km from the Proposed Project. No surface water or groundwater pathways exist. Ballynafagh Lake is a disused reservoir which fed the Grand Canal from the 1800s to the 1960s and has since naturalised. The reservoir is influenced by the local geology and hydrogeology in the immediate vicinity of the reservoir. Moreover, given the distance between the Proposed Project and Ballynafagh Lake, the change in geology between Ballynafagh Lake and the location of the Proposed Project, the change in the aquifer characteristics, and the presence of low permeability soils, it is not possible for the Proposed Project to impact on Ballynafagh Lake SAC. There is therefore no pathway for effects as a result of the Proposed Project. This SAC is crossed by the proposed Haul Roads. All proposed Haul Roads traverse through European sites along existing roads only and are built land. Potential risks associated with indirectly introducing/spreading INNS via contaminated soil/material on construction traffic were considered. The spread/introduction of INNS as a result of construction traffic leaving the Proposed Project and travelling away from site along the proposed Haul Roads will be avoided by the inclusion of standard best practice features (i.e. vehicular wheel wash down facilities adjacent to site entrances/exits) within the Proposed Project. Thus, it has been determined there is no potential that construction traffic movement along the Haul Roads to and from the Proposed Project will introduce/spread INNS to the Ballynafagh Lake SAC. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Slieve Bloom Mountains SAC [000412]	S.I. 161/2022/ CO Version 1.0 (6 September 2016)		4.6km south-east				Northern Atlantic wet heaths with *Erica tetralix* [4010] Blanket bogs (* if active bog) [7130] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)* [91E0]	This SAC is located upstream and in an elevated position 4.6km from the Proposed Project. No surface water or groundwater pathway exists. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Keeper Hill SAC [001197]	S.I. 656/2021/ CO Version 1.0 (17 October 2017)		5km south-west				Northern Atlantic wet heaths with *Erica tetralix* [4010] Blanket bogs (* if active bog) [7130]	This SAC is located upstream and in an elevated position 5km from the Proposed Project. No surface water or groundwater pathway exists. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Charleville Wood SAC [000571]	S.I. No. 658/2019/ CO Version 1.0 (11 November 2021)			5.1km north			Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)* [91E0] Desmoulin's Whorl Snail (*Vertigo moulinsiana*) [1016]	This SAC is located 5.1km as the crow flies and downstream of the Proposed Project. Surface water pathways exist. Proposed Construction Phase and Operational Phase activities could lead to habitat degradation as a result of hydrological effects associated with the Proposed Project, alone and/or in-combination with other plans or projects. This SAC is crossed by the proposed Haul Roads. All proposed Haul Roads traverse through European sites along existing roads only and are built land. Potential risks associated with indirectly introducing/spreading INNS via contaminated soil/material on construction traffic were considered. The spread/introduction of INNS as a result of construction traffic leaving the Proposed Project and travelling away from site along the proposed Haul Roads will be avoided by the inclusion of standard best practice features (i.e. vehicular wheel wash down facilities adjacent to site entrances/exits) within the Proposed Project. Thus, it has been determined there is no potential that construction traffic movement along the Haul Roads to and from the Proposed Project will introduce/spread INNS to the Charleville Wood SAC. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	Yes
Ballynafagh Bog SAC [000391]	S.I. No. 141/2017/ CO Version 1.0 (10 November 2015)			5.4km south			Active raised bogs* [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150]	This SAC is located in a separate geological formation and river sub-catchment and in an elevated position 5.4km from the Proposed Project. No surface water or groundwater pathway exists. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Slieve Bernagh Bog SAC [002312]	S.I. 385/2022/ CO Version 1.0 (18 August 2016)			5.4km north-west			Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Blanket bogs (* if active bog) [7130]	This SAC is located in a separate geological formation and river sub-catchment and in an elevated position 5.4km from the Proposed Project. No surface water or groundwater pathway exists. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Silvermines Mountains SAC [000939]	S.I. 148/2017/ CO Version 1.0 (5 July 2018)			5.6km north			Northern Atlantic wet heaths with *Erica tetralix* [4010] Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* [6230]	This SAC is located upstream and in an elevated position 5.6km from the Proposed Project. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Liskeenan Fen SAC [001683]	S.I. No. 302/2016/ CO Version 1.0 (18 May 2018)			6.8km north-west			Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae** [7210]	This SAC is located in a separate geological formation and river sub-catchment 6.8km from the Proposed Project. No surface water or groundwater pathway exists. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)

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		0-1km	1-5km	5-10km	10-15km	> 15km			
Bolingbrook Hill SAC [002124]	S.I. No. 147/2017/ CO Version 1.0 (5 July 2018)			7.8km south			Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* [6230]	This SAC is located upstream and in an elevated position within the Silvermines and Slieve Felim Mountains 7.8km from the Proposed Project. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Raheenmore Bog SAC [000582]	S.I. No. 299/2019/ CO Version 1.0 (2 November 2015)			8.2km north-west			Active raised bogs* [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150]	This SAC is located 8.2km and upstream of the Proposed Project. No surface water or groundwater pathways exist due to the distance, changes in geology and location upgradient of the Proposed Project. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Ballyduff/Clonfinane Bog SAC [000641]	S.I. No. 555/2021/ CO Version 1.0 (23 November 2015)			8.3km north-west			Active raised bogs* [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150] Bog woodland* [91D0]	This SAC is located in a separate river sub-catchment 8.2km from the Proposed Project. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Arragh More (Derrybreen) Bog SAC [002207]	S.I. No. 736/2022/ CO Version 1.0 (13 June 2023)			8.7km north-west			Degraded raised bogs still capable of natural regeneration [7120]	This SAC is located in a separate river sub-catchment 8.7km from the Proposed Project. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Glenomra Wood SAC [001013]	S.I. No. 519/2016/ CO Version 1.0 (19 June 2018)			8.8km south-west			Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	This SAC is located in a separate river sub-catchment 8.8km from the Proposed Project. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Mouds Bog SAC [002331]	S.I. No. 62/2022/ CO Version 1.0 (20 November 2015)			9km south-east			Active raised bogs* [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150]	This SAC is located in a separate river sub-catchment 9km from the Proposed Project. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Clare Glen SAC [000930]	S.I. No. 298/2016/ CO Version 1.0 (16 May 2018)			9.1km south			Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] *Trichomanes speciosum* (Killarney Fern) [1421]	This SAC is located in a separate river sub-catchment 9.1km from the Proposed Project. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Kilcarren-Firville Bog SAC [000647]	S.I. No. 556/2021/ CO Version 1.0 (27 June 2016)			9.2km north-west			Active raised bogs* [7110]* Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150]	This SAC is located in a separate river sub-catchment 9.2km from the Proposed Project. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Ridge Road, SW of Rapemills SAC [000919]	S.I. No. 179/2016/ CO Version 1.0 (26 June 2018)			9.5km north			Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites) [6210]	This SAC is located in a separate river sub-catchment 9.5km from the Proposed Project. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Glenasmole Valley SAC [001209]	S.I. No. 345/2021/ CO Version 6.0 (10 December 2021)			9.9km south-east			Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites) [6210] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Petrifying springs with tufa formation (*Cratoneurion*)* [7220]	This SAC is located in a separate river sub-catchment 9.9km from the Proposed Project. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Danes Hole, Poulnalecka SAC [000030]	S.I. No. 88/2016/ CO Version 1.0 (24 July 2018)			10km north-west			Lesser horseshoe bat (*Rhinolophus hipposideros*) [1303] Caves not open to the public [8310] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	This SAC is located in a separate groundwater catchment and river sub-catchment 10km from the Proposed Project and is regarded as being beyond the normal core foraging range of the Danes Hole lesser horseshoe bat population and beyond the normal commuting range of this species, except on exceptional occasions or over long periods of time (for example, bats dispersing and moving between areas in the wider landscape over a period of many year/generations). Due to the lack of a linkage between the Proposed Project and the Danes Hole roost, the Proposed Project would not influence the existing population dynamic of Danes Hole, Poulnalecka SAC's lesser horseshoe bat population in any way or affect the conservation objectives supporting its conservation condition in Danes Hole, Poulnalecka SAC. No source-pathway-receptor exists, and therefore no pathway for effects.	No potential for effects (no source-pathway-receptor)

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		0-1km	1-5km	5-10km	10-15km	> 15km			
Wicklow Mountains SAC [002122]	No S.I./ CO Version 1.0 (31 July 2017)				11.1km south-east		Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea* [3130] Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110] Natural dystrophic lakes and ponds [3160] Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] Calaminarian grasslands of the *Violetalia calaminariae* [6130] Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* [6230] Blanket bogs (* if active bog) [7130] Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) [8110] Calcareous rocky slopes with chasmophytic vegetation [8210] Siliceous rocky slopes with chasmophytic vegetation [8220] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] *Lutra lutra* (Otter) [1355]	This SAC is located in a separate river sub-catchment 11.1km from the Proposed Project. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project. No source-pathway-receptor exists, and therefore no pathway for effects.	No potential for effects (no pathway)
Pollardstown Fen SAC [000396]	S.I. No. 542/2018/ CO Version 1.0 (14 June 2022)				11.1km south		Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae* [7210] Petrifying springs with tufa formation (*Cratoneurion*)* [7220] Alkaline fens [7230] Geyer's whorl snail (*Vertigo geyeri*) [1013] Narrow-mouthed whorl snail (*Vertigo angustior*) [1014] Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016]	This SAC is located in a separate river sub-catchment 11.1km from the Proposed Project. A GWDTE zone of contribution is delineated to the south and south-west of the fen. No groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project. No source-pathway-receptor exists, and therefore no pathway for effects.	No potential for effects (no pathway)
Glenstal Wood SAC [001432]	S.I. No. 419/2018/ CO Version 1.0 (15 May 2018)				11.5km south		Killarney Fern (*Trichomanes speciosum*) [1421]	This SAC is located in a separate river sub-catchment 11.5km from the Proposed Project. A locally important aquifer exists in the area; however, no groundwater pathway exists, nor a surface water pathway due to the distance, changes in geology and location upgradient of the Proposed Project. No source-pathway-receptor exists, and therefore no pathway for effects.	No potential for effects (no pathway)
All Saints Bog and Esker SAC [000566]	S.I. No. 98/2019/ CO Version 1.0 (2 March 2016)				11.5km north-west		Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites) [6210] Active raised bogs* [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150] Bog woodland* [91D0]	This SAC is located 11.5km as the crow flies and downstream of the Proposed Project. It is partially located in the same river catchment as part of the Proposed Project; however, no surface water pathway exists. A locally important aquifer exists in the area; however, no groundwater pathway exists, nor a surface water pathway due to the distance, changes in geology and location upgradient of the Proposed Project. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Red Bog, Kildare SAC [000397]	S.I. No. 76/2018/ CO Version 1.0 (17 July 2019)				12.1km south		Transition mires and quaking bogs [7140]	This SAC is located in a separate river sub-catchment 12.1km from the Proposed Project. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Clara Bog SAC [000572]	No. S.I./ CO Version 1.0 (3 August 2016)				12.7km north		Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites) [6210] Active raised bogs* [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150] Bog woodland* [91D0]	This SAC is located in a separate river sub-catchment 12.7km from the Proposed Project. A locally important aquifer exists in the area; however, the Proposed Project and SAC are not located in the same Clara GWDTE. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no source-pathway-receptor)
Mountmellick SAC [002141]	S.I. No. 185/2016/ CO Version 1.0 (5 March 2021)				12.8km south-east		Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016]	This SAC is located in a separate river sub-catchment 12.8km from the Proposed Project. The SAC is a disused section of the Grand Canal between Dangan's Bridge and Skeagh Bridge. A locally important aquifer exists in the area; however, no groundwater pathway exists, nor a surface water pathway due to the distance, changes in geology and location upgradient of the Proposed Project. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no source-pathway-receptor)
River Boyne and River Blackwater SAC [002299]	S.I. No. 451/2024/ CO Version 1.0 (3 December 2021)				13.1km north		Alkaline fens [7230] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)* [91E0] River lamprey (*Lampetra fluviatilis*) [1099] Salmon (*Salmo salar*) [1106] Otter (*Lutra lutra*) [1355]	This SAC is located 13.1km as the crow flies and downstream of the Proposed Project. Surface water pathways exist. Proposed Construction Phase and Operational Phase activities could lead to habitat degradation as a result of hydrological effects and/or the spread of INNS associated with the Proposed Project, alone and/or in-combination with other plans or projects.	Yes
Cloonmoylan Bog SAC [000248]	S.I. No. 158/2022/ CO Version 1.0 (13 January 2016)				14.2km north-west		Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150] Bog woodland [91D0]	This SAC is located in a separate river sub-catchment 14.2km from the Proposed Project. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)

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		0-1km	1-5km	5-10km	10-15km	> 15km			
River Shannon Callows SAC [000216]	S.I. No. 473/2021/ CO Version 1.0 (18 January 2022)				14.7km north		*Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510] Alkaline fens [7230] Limestone pavements* [8240] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)* [91E0] Otter (*Lutra lutra*) [1355]	This SAC is located 14.7km north of the Proposed Project at its closest point. It is downstream of the following watercourses crossed by the pipeline; Kyleboher Stream (WCX034), Kilgolan Lower Stream (WCX035), Silver River (WCX036), and House Derries Stream (WCX038). Surface water and groundwater pathways exist. It is also located within the hydrological ZoI for the RWI&PS, i.e. Potential effects in the River Shannon could occur as a result of changes to water levels in Lough Derg. Approximately 16km upstream of Lough Derg, Meelick Weir, operated by Waterways Ireland, is used to maintain minimum navigation levels between Athlone and Meelick. There is a free fall of water over Meelick Weir at medium and low flows and so changes to the water levels of Lough Derg have no influence on water levels upstream of Meelick Weir. This then sets the upper limit of the study area on the River Shannon system. Proposed Construction Phase and Operational Phase activities could lead to habitat degradation as a result of hydrological/hydrogeological effects associated with the Proposed Project, alone and/or in-combination with other plans or projects. This SAC is crossed by the proposed Haul Roads. All proposed Haul Roads traverse through European sites along existing roads only and are built land. Potential risks associated with indirectly introducing/spreading INNS via contaminated soil/material on construction traffic were considered. The spread/introduction of INNS as a result of construction traffic leaving the Proposed Project and travelling away from site along the proposed Haul Roads will be avoided by the inclusion of standard best practice features (i.e. vehicular wheel wash down facilities adjacent to site entrances/exits) within the Proposed Project. Thus, it has been determined there is no potential that construction traffic movement along the Haul Roads to and from the Proposed Project will introduce/spread INNS to the River Shannon Callows SAC. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	Yes
Kilduff, Devilsbit Mountain SAC [000934]	S.I. No. 145/2017/ CO Version 1.0 (5 July 2018)					15km south	European dry heaths [4030] Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230]	This SAC is located in an elevated area (>250mOD) upgradient and over 15km from the Proposed Project. No surface water or groundwater pathways exist. Considering the distance from the Proposed Project, the nature of the Proposed Project, and the qualifying interests of this SAC, no source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Split Hills and Long Hill Esker SAC [001831]	S.I. No. 660/2019/ CO Version 1.0 (20 June 2018)					15.1km north	Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites) [6210]	This SAC is located in a separate river sub-catchment 15.1km from the Proposed Project. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Loughatorick South Bog SAC [000308]	S.I. No. 474/2019/ CO Version 1.0 (26 March 2019)					17km north-west	Blanket bogs (* if active bog) [7130]	This blanket bog SAC is located in an elevated area (>160mOD) upgradient and over 17km from the Proposed Project. No surface water or groundwater pathways exist. Considering the distance from the Proposed Project, the nature of the Proposed Project, and the qualifying interests of this SAC, no source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
South Dublin Bay SAC [000210]	S.I. No. 525/2019/ CO Version 1.0 (22 August 2013)					18km east	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] *Salicornia* and other annuals colonising mud and sand [1310] Embryonic shifting dunes [2110]	This coastal SAC is located 18km from the Proposed Project. It is downstream of the following watercourses crossed by the pipeline: Posseckstown Stream (WCX071), Ardrass Lower (WCX072), Reeves Stream (WCX074), River Liffey (WCX073), and the Grand Canal (WBX088). Surface water pathways exist. In the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for effects beyond the Liffey Estuary Lower and into the South Dublin Bay SAC. This SAC is located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project.	No potential for effects (no source-pathway-receptor)
North Dublin Bay SAC [000206]	S.I. No. 524/2019/ CO Version 1.0 (6 November 2013)					20.4km east	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] Petalwort (*Petalophyllum ralfsii*) [1395]	This coastal SAC is located 20.4km from the Proposed Project. It is downstream of the following watercourses crossed by the pipeline: Posseckstown Stream (WCX071), Ardrass Lower (WCX072), Reeves Stream (WCX074), River Liffey (WCX073), and the Grand Canal (WBX088). Surface water pathways exist. In the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for effects beyond the Liffey Estuary Lower and into the North Dublin Bay SAC. This SAC is located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project.	No potential for effects (no source-pathway-receptor)
Pollagoona Bog SAC [002126}	S.I. No. 602/2019/ CO Version 1.0 (29 May 2017)					24km north-west	Blanket bogs (* if active bog) [7130]	This blanket bog SAC is located in an elevated area (>150mOD) upgradient and over 24km from the Proposed Project. No surface water or groundwater pathways exist. Considering the distance from the Proposed Project, the nature of the Proposed Project, and the qualifying interests of this SAC, no source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)

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		0-1km	1-5km	5-10km	10-15km	> 15km			
Lower River Suir SAC [002137]	S.I. No. 650/2024/ CO Version 1.0 (28 March 2017)					24km south	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Watercourses of plain to montane levels with the *Ranunculion fluitantis and Callitricho-Batrachion* vegetation [3260] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] *Taxus baccata* woods of the British Isles [91J0] Freshwater pearl mussel (*Margaritifera margaritifera*) [1029] White-clawed crayfish (*Austropotamobius pallipes*) [1092] Sea lamprey (*Petromyzon marinus*) [1095] Brook lamprey (*Lampetra planeri*) [1096] River lamprey (*Lampetra fluviatilis*) [1099] Twaite shad (*Alosa fallax fallax*) [1103] Salmon (*Salmo salar*) [1106] Otter (*Lutra lutra*) [1355]	This SAC is located in a separate groundwater body and surface water catchment, 24km from the Proposed Project. No surface water or groundwater pathway exists. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Malahide Estuary SAC [000205]	S.I. No. 91/2019/ CO Version 1.0 (27 May 2013)					25km east	Mudflats and sandflats not covered by seawater at low tide [1140] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	This coastal SAC is located 25km from the Proposed Project. No surface water or groundwater pathways exist due to the distance, changes in geology and location upgradient of the Proposed Project. Considering the distance from the Proposed Project, the nature of the Proposed Project, and the qualifying interests of this SAC, no source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Baldoyle Bay SAC [000199]	S.I. No. 472/2021/ CO Version 1.0 (19 November 2012)					25km east	Mudflats and sandflats not covered by seawater at low tide [1140] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	This coastal SAC is located 25km from the Proposed Project. No surface water or groundwater pathways exist due to the distance, changes in geology and location upgradient of the Proposed Project. Considering the distance from the Proposed Project, the nature of the Proposed Project, and the qualifying interests of this SAC, no source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Glendree Bog SAC [001912]	S.I. No. 652/2019/ CO Version 1.0 (29 March 2019)					25km north-west	Blanket bogs (* if active bog) [7130]	This blanket bog SAC is located in an elevated area (>230mOD) upgradient and over 33km from the Proposed Project. No surface water or groundwater pathways exist. Considering the distance from the Proposed Project, the nature of the Proposed Project, and the qualifying interests of this SAC, no source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Howth Head SAC [000202]	S.I. No. 524/2021/ CO Version 1.0 (6 December 2016)					26km east	Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] European dry heaths [4030]	This coastal SAC is located 26km from the Proposed Project. No surface water or groundwater pathways exist due to the distance and changes in geology. Considering the distance from the Proposed Project, the nature of the Proposed Project, and the qualifying interests of this SAC, no source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Rockabill to Dalkey Island SAC [003000]	S.I. No. 94/2019/ CO Version 1.0 (7 May 2013)					26.1km east	Reefs [1170] Harbour porpoise (*Phocoena phocoena*) [1351]	This coastal SAC is located 26.1km from the Proposed Project. Surface water pathways exist. In the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for effects beyond the Liffey Estuary Lower and into the Rockabill Dalkey SAC. This SAC is located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project.	No potential for effects (no source-pathway-receptor)
Philipston Marsh SAC [001847]	S.I. No. 181/2016/ CO Version 1.0 (12 January 2018)					27km south	Transition mires and quaking bogs [7140]	This SAC is located in a separate river sub-catchment, 27km from the Proposed Project. No surface water or groundwater pathways exist due to the distance and changes in geology. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Ireland's Eye SAC [002193]	S.I. No. 501- 2017/ CO Version 1.0 (27 January 2017)					29km east	Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	This coastal SAC is located 29km from the Proposed Project. No surface water or groundwater pathways exist due to the distance and changes in geology. Considering the distance from the Proposed Project, the nature of the Proposed Project, and the qualifying interests of this SAC, no source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Ballyprior Grassland SAC [002256]	S.I. No. 188/2016/ CO Version 1.0 (11 November 2021)					33km south	Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210]	This SAC is located on an elevated area (220mOD) and over 33km from the Proposed Project. No surface water or groundwater pathways exist. Considering the distance from the Proposed Project, the nature of the Proposed Project, and the qualifying interests of this SAC, no source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)

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		0-1km	1-5km	5-10km	10-15km	> 15km			
Lough Ree SAC [000440]	S.I. No. 466/2023/ CO Version 1.0 (9 August 2016)					35km north	Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation [3150] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210] Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Alkaline fens [7230] Limestone pavements [8240] Bog woodland [91D0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] Otter (*Lutra lutra*) [1355]	This SAC is crossed by the proposed Haul Roads. All proposed Haul Roads traverse through European sites along existing roads only and are built land. Potential risks associated with indirectly introducing/spreading INNS via contaminated soil/material on construction traffic were considered. The spread/introduction of INNS as a result of construction traffic leaving the Proposed Project and travelling away from site along the proposed Haul Roads will be avoided by the inclusion of standard best practice features (i.e. vehicular wheel wash down facilities adjacent to site entrances/exits) within the Proposed Project. Thus, it has been determined there is no potential that construction traffic movement along the Haul Roads to and from the Proposed Project would introduce/spread INNS to the Lough Ree SAC. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects. This European site is also protected for otter that may be at risk of collision with construction traffic, which could result in mortality. Considering the Haul Roads are built land and are not suitable habitat for otter, the likelihood of construction traffic colliding with this qualifying interest species is low. Furthermore, construction traffic would be using Haul Roads during daylight hours and therefore would be unlikely to come upon otter, which are nocturnal in habit. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no source-pathway-receptor)
Kerry Head Shoal SAC [002263]	S.I. No. 102/2016/ CO Version 1.0 (14 October 2013)					108km south-west	Reefs [1170]	This coastal SAC is located at the mouth of the River Shannon, 108km from the Proposed Project. A surface water pathway exists; however, the Old River Shannon is tidal at its confluence with the Tailrace, therefore the water level would not be impacted by changes upstream. The confluence therefore forms the lower limit of the hydrological ZoI on the Tailrace and the Old River Shannon. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no source-pathway-receptor)
Slievefelim to Silvermines Mountains SPA [004165]	S.I. No. 587/2011/ CO Version 1.0 (23 September 2022)		1.5km south-east				Hen harrier (*Circus cyaneus*) [A082]	This SPA is located 1.5km south-east of the Proposed Project. The site is designated for hen harrier. The core foraging range of breeding hen harrier is 2km, with a maximum range of 10km (SNH 2016). Therefore, connectivity could exist between the Proposed Project and this European site. The construction of the Proposed Project could result in a reduction of supporting habitat for this species and construction activities may result in effective habitat loss through disturbance displacement associated with the Proposed Project, alone and/or in-combination with other plans or projects.	Yes
Slieve Bloom Mountains SPA [004160]	S.I. No. 184/2012/ CO Version 1.0 (23 September 2022)		2.5km south-east				Hen harrier (*Circus cyaneus*) [A082]	This SPA is located 2.5km south-east of the Proposed Project. The site is designated for hen harrier. The core foraging range of breeding hen harrier is 2km, with a maximum range of 10km (SNH 2016). Therefore, connectivity could exist between the Proposed Project and this European site. The construction of the Proposed Project could result in a reduction of supporting habitat for this species and construction activities may result in effective habitat loss through disturbance displacement associated with the Proposed Project, alone and/or in-combination with other plans or projects.	Yes
Lough Derg (Shannon) SPA [004058]	S.I. No. 331/2019/ CO Version 1.0 (27 August 2024)		4km north				Cormorant (*Phalacrocorax carbo*) [A017] (Breeding & Wintering) Tufted duck (*Aythya fuligula*) [A061] (Wintering) Goldeneye (*Bucephala clangula*) [A067] (Wintering) Common tern (*Sterna hirundo*) [A193] (Breeding)	This SPA is located 4km north of the Proposed Project and would not be directly impacted. However, Parteen Basin hosts a large assemblage of winter water birds annually. This site regularly supports nationally important numbers of wintering tufted duck (370 birds constitute a flock of national importance; Boland and Crowe 2012), a special conservation interest species of the Lough Derg (Shannon) SPA. Other special conservation interest species, including cormorant and goldeneye were also recorded at Parteen Basin, albeit in numbers of lower significance. The proposed construction of the RWI&PS at Parteen Basin and associated construction activities would result in habitat loss and may result in disturbance and effective habitat loss through habitat degradation or disturbance/displacement associated with the Proposed Project, alone and/or in-combination with other plans or projects. This SPA is downstream of the following watercourses crossed by the pipeline; Ardgregane Stream (WCX011 and WCX013), Fathen Stream (WCX012), Monsea Stream (WCX014 and WCX015), Nenagh River (WCX016) and Upper Ballyanny Stream (WCX017). Surface water and groundwater pathways also exist. It is also located within the hydrological ZoI for the RWI&PS, i.e. Lough Derg is hydraulically connected immediately upstream of Parteen Basin. Its water levels are controlled by the same operating regime as Parteen Basin. Proposed Construction Phase and Operational Phase activities could lead to habitat degradation as a result of hydrological/hydrogeological effects associated with the Proposed Project, alone and/or in-combination with other plans or projects. This SPA is crossed by the proposed Haul Roads. All proposed Haul Roads traverse through European sites along existing roads only and are built land. Potential risks associated with indirectly introducing/spreading INNS via contaminated soil/material on construction traffic were considered. The spread/introduction of INNS as a result of construction traffic leaving the Proposed Project and travelling away from site along the proposed Haul Roads will be avoided by the inclusion of standard best practice features (i.e. vehicular wheel wash down facilities adjacent to site entrances/exits) within the Proposed Project. Thus, it has been determined there is no potential that construction traffic movement along the Haul Roads to and from the	Yes

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		0-1km	1-5km	5-10km	10-15km	> 15km			
								Proposed Project will introduce/spread INNS to the Lough Derg (Shannon) SPA. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects. This SPA is also protected for avian species that may be at risk of collision with construction traffic, which could result in mortality. Considering the Haul Roads are built land and are not suitable habitat for birds, the likelihood of construction traffic colliding with special conservation interest bird species is low. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	
Dovegrove Callows SPA [004137]	S.I. No. 384/2010/ CO Version 1.0 (17 January 2025)			7km north-west			Greenland white-fronted goose (*Anser albifrons flavirostris*) [A395]	This SPA is located 7km northwest of the Proposed Project. The core foraging range of Greenland white-fronted goose is 5-8km (SNH 2016). Therefore, connectivity could exist between the Proposed Project and this European site. This site is also a support site to the River Little Brosna Callows SPA. Proposed construction activities could potentially result in a loss of supporting habitat for the special conservation interest species of this SPA. A surface water pathway also exists between the Proposed Project and this SPA; therefore, proposed Construction Phase and Operational Phase activities could lead to habitat degradation as a result of hydrological/hydrogeological effects associated with the Proposed Project, alone and/or in-combination with other plans or projects.	Yes
River Little Brosna Callows SPA [004086]	S.I. No. 652/2011/ CO Version 1.0 (31 January 2025)			10km north-west			Whooper swan (*Cygnus cygnus*) [A038] Wigeon (*Anas penelope*) [A050] Teal (*Anas crecca*) [A052] Pintail (*Anas acuta*) [A054] Shoveler (*Anas clypeata*) [A056] Golden plover (*Pluvialis apricaria*) [A140] Lapwing (*Vanellus vanellus*) [A142] Black-tailed godwit (*Limosa limosa*) [A156] Black-headed gull (*Chroicocephalus ridibundus*) [A179] Greenland white-fronted goose (*Anser albifrons flavirostris*) [A395] Wetland and waterbirds [A999]	This SPA is located 10km north of the Proposed Project and is not directly connected to the Proposed Project; however, habitat within the Proposed Project could potentially provide supporting habitat to special conservation interest species for which this site is designated. Lapwing and golden plover regularly range to a distance of 15km between foraging locations (Gillings *et al.* 2005). Similarly, black-headed gulls have a maximum foraging distance of 18.5km during the breeding season (Gorke and Brandl 1986). Conversely dabbling ducks typically forage at lesser distances of 1-2km from roosts (Legagneux *et al.* 2009). It is therefore considered that connectivity could exist between the Proposed Project and this SPA for several special conservation interest species for which the site was designated. The construction of the Proposed Project could result in a reduction of supporting habitat for these species and construction activities may result in effective habitat loss through disturbance/displacement associated with the Proposed Project, alone and/or in-combination with other plans or projects.	Yes
River Shannon and River Fergus Estuaries SPA [004077]	S.I. No. 329/2019/ CO Version 1.0 (17 September 2012)			6km south-west			Black-headed gull (*Chroicocephalus ridibundus*) [A179] Grey Plover (*Pluvialis squatarola*) [A141] Whooper swan (*Cygnus cygnus*) [A038] Golden plover (*Pluvialis apricaria*) [A140] Shelduck (*Tadorna tadorna*) [A048] Bar-tailed godwit (*Limosa lapponica*) [A157] Light-bellied brent goose (*Branta bernicla hrota*) [A046] Ringed plover (*Charadrius hiaticula*) [A137] Black-tailed godwit (*Limosa limosa*) [A156] Curlew (*Numenius arquata*) [A160] Greenshank (*Tringa nebularia*) [A164] Wigeon (*Anas penelope*) [A050] Redshank (*Tringa totanus*) [A162] Lapwing (*Vanellus vanellus*) [A142] Cormorant (*Phalacrocorax carbo*) [A017] Shoveler (*Anas clypeata*) [A056] Teal (*Anas crecca*) [A052] Knot (*Calidris canutus*) [A143] Scaup (*Aythya marila*) [A062] Pintail (*Anas acuta*) [A054] Dunlin (*Calidris alpina*) [A149] Wetlands	This SPA is located 6km south-west of the Proposed Project and is not directly connected to the Proposed Project; however, habitat within the Proposed Project could potentially provide supporting habitat to special conservation interest species for which this site is designated. The Proposed Project is located within the maximum foraging range of 50km for breeding cormorant (NPWS 2012b) which is one of the special conservation interest species associated with this SPA. It is therefore considered that connectivity could exist between the Proposed Project and this SPA for cormorant. The construction of the Proposed Project could result in a reduction of supporting habitat for this species and construction activities may result in effective habitat loss through disturbance/displacement associated with the Proposed Project, alone and/or in-combination with other plans or projects. This SPA is crossed by the proposed Haul Roads. All proposed Haul Roads traverse through European sites along existing roads only and are built land. Potential risks associated with indirectly introducing/spreading INNS via contaminated soil/material on construction traffic were considered. The spread/introduction of INNS as a result of construction traffic leaving the Proposed Project and travelling away from site along the proposed Haul Roads will be avoided by the inclusion of standard best practice features (i.e. vehicular wheel wash down facilities adjacent to site entrances/exits) within the Proposed Project. Thus, it has been determined there is no potential that construction traffic movement along the Haul Roads to and from the Proposed Project will introduce/spread INNS to the River Shannon and River Fergus Estuaries SPA. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects. This SPA is also protected for avian species that may be at risk of collision with construction traffic, which could result in mortality. Considering the Haul Roads are built land and are not suitable habitat for birds, the likelihood of construction traffic colliding with special conservation interest bird species is low. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	Yes
All Saints Bog SPA [004103]	S.I. No. 298/1996/ CO Version 1.0 (18 April 2025)				11.5km north-west		Greenland white-fronted goose (*Anser albifrons flavirostris*) [A395]	This SPA is located 11.5km north-west of the Proposed Project and is a support site to River Little Brosna Callows SPA. Greenland white-fronted goose is the only special conservation interest species of this SPA. The core foraging range of Greenland white-fronted goose is 5-8km (SNH 2016). No Greenland white-fronted geese were recorded within the study area of the Proposed Project during wintering bird surveys undertaken between 2015/2016 and 2023/2024. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no source-pathway-receptor)

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		0-1km	1-5km	5-10km	10-15km	> 15km			
Slieve Aughty Mountains SPA [004168]	S.I. No. 83/2012/ CO Version 1.0 (20 December 2022)				12.5km north-west		Hen harrier (*Circus cyaneus*) [A082] Merlin (*Falco columbarius*) [A098]	This SPA is located 12.5km north-west of the Proposed Project. The site is designated for hen harrier and merlin. The core foraging range of breeding hen harrier is 2km, with a maximum range of 10km and the core foraging range for merlin is within 5km (SNH 2016). Therefore, connectivity is unlikely but possible between the Proposed Project and this European site. The construction of the Proposed Project could result in a reduction of supporting habitat for these species and construction activities may result in effective habitat loss through disturbance/displacement associated with the Proposed Project, alone and/or in-combination with other plans or projects.	Yes
River Boyne and River Blackwater SPA [004232]	S.I. No. 462/2012/ CO Version 1.0 (2 July 2024)				13.1km north		Kingfisher (*Alcedo atthis*) [A229]	This SPA is located 13.1km as the crow flies north and downstream of the Proposed Project. Surface and groundwater pathways exist. Proposed Construction Phase and Operational Phase activities could lead to habitat degradation as a result of hydrological/hydrogeological effects associated with the Proposed Project, alone and/or in-combination with other plans or projects.	Yes
Poulaphouca Reservoir SPA [004063]	S.I. No. 73/2010/ CO Version 1.0 (11 June 2024)				14.6km south		Greylag goose (*Anser anser*) [A043] Lesser black-backed gull (*Larus fuscus*) [A183]	This SPA is located 14.6km south of the Proposed Project; however, habitat within the Proposed Project could potentially provide supporting habitat to special conservation interest species for which this site is designated. The Proposed Project is located within the connectivity distance for wintering greylag geese, which have a core foraging range of 15-20km (SNH 2016). Similarly, lesser black-backed gulls are known to forage over large distances (Lloyd *et al.* 2010). These species utilise improved grassland for foraging, a habitat type which is common throughout the Proposed Project and wider surrounding landscape. The construction of the Proposed Project could result in a reduction of supporting habitat for these species and construction activities may result in effective habitat loss through disturbance displacement associated with the Proposed Project, alone and/or in-combination with other plans or projects.	Yes
Wicklow Mountains SPA [004040]	S.I. No. 586/2012/ CO Version 1.0 (16 July 2024)				15km south-east		Merlin (*Falco columbarius*) [A098] Peregrine (*Falco peregrinus*) [A103]	This SPA is located 15km east of the Proposed Project. Merlin and peregrine are the only special conservation interest species of this SPA. The core foraging range of merlin is 5km and for peregrine is 2km (SNH 2016). No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no source-pathway-receptor)
Middle Shannon Callows SPA [004096]	S.I. No. 41/2012/ CO Version 1.0 (15 November 2022)					18km north-west	Whooper swan (*Cygnus cygnus*) [A038] (Wintering) Wigeon (*Anas penelope*) [A050] (Wintering) Corncrake (*Crex crex*) [A122] (Breeding) Golden plover (*Pluvialis apricaria*) [A140] (Wintering) Lapwing (*Vanellus vanellus*) [A142] (Wintering and Breeding) Black-tailed godwit (*Limosa limosa*) [A156] (Wintering and Breeding) Black-headed gull (*Chroicocephalus ridibundus*) [A179] (Wintering) Wetland and waterbirds [A999]	This SPA is located 18km north-west of the Proposed Project. It is downstream of the following watercourses crossed by the pipeline; Kyleboher Stream (WCX034), Kilgolan Lower Stream (WCX035), Silver River (WCX035), and House Derries Stream (WCX038). Surface water pathways exist. It is also located within the hydrological ZoI for the RWI&PS, i.e. potential effects in the River Shannon would be possible as a result of changes to water levels in Lough Derg. Approximately 16km upstream of Lough Derg, Meelick Weir, operated by Waterways Ireland, is used to maintain minimum navigation levels between Athlone and Meelick. There is a free fall of water over Meelick Weir at medium and low flows and so changes to the water levels of Lough Derg have no influence on water levels upstream of Meelick Weir. This then sets the upper limit of the study area on the River Shannon system. Proposed Construction Phase and Operational Phase activities could lead to habitat degradation as a result of hydrological effects associated with the Proposed Project, alone and/or in-combination with other plans or projects. This SPA is crossed by the proposed Haul Roads. All proposed Haul Roads traverse through European sites along existing roads only and are built land. Potential risks associated with indirectly introducing/spreading INNS via contaminated soil/material on construction traffic were considered. The spread/introduction of INNS as a result of construction traffic leaving the Proposed Project and travelling away from site along the proposed Haul Roads will be avoided by the inclusion of standard best practice features (i.e. vehicular wheel wash down facilities adjacent to site entrances/exits) within the Proposed Project. Thus, it has been determined there is no potential that construction traffic movement along the Haul Roads to and from the Proposed Project will introduce/spread INNS to the Middle Shannon Callows SPA. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects. This SPA is also protected for avian species that may be at risk of collision with construction traffic, which could result in mortality. Considering the Haul Roads are built land and are not suitable habitat for birds, the likelihood of construction traffic colliding with special conservation interest bird species is low. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	Yes

European Site	Statutory Instrument (S.I.) / Conservation Objectives (CO) Version	Approximate Distances (km) from the Proposed Project Boundary to the European Site Boundary					Qualifying Interest(s)/Special Conservation Interest Species	Description of Potential for Likely Significant Effects from the Proposed Project (alone or in-combination, where relevant)	Possibility of Likely Significant Effects
		0-1km	1-5km	5-10km	10-15km	> 15km			
River Nore SPA [004233]	S.I. No. 193/2012/ CO Version 1.0 (2 July 2024)					18km south	Kingfisher (*Alcedo atthis*) [A229]	This SPA is crossed by the proposed Haul Roads. All proposed Haul Roads traverse through European sites along existing roads only and are built land. Potential risks associated with indirectly introducing/spreading INNS via contaminated soil/material on construction traffic were considered. The spread/introduction of INNS as a result of construction traffic leaving the Proposed Project and travelling away from site along the proposed Haul Roads will be avoided by the inclusion of standard best practice features (i.e. vehicular wheel wash down facilities adjacent to site entrances/exits) within the Proposed Project. Thus, it has been determined there is no potential that construction traffic movement along the Haul Roads to and from the Proposed Project would introduce/spread INNS to the River Nore SPA. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects. This SPA is also protected for avian species that may be at risk of collision with construction traffic, which could result in mortality. Considering the Haul Roads are built land and are not suitable habitat for birds, the likelihood of construction traffic colliding with special conservation interest bird species is low. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no source-pathway-receptor)
South Dublin Bay and River Tolka Estuary SPA [004024]	S.I. No. 212/2010/ CO Version 1.0 (9 March 2015)					18km east	Light-bellied brent goose (*Branta bernicla hrota*) [A046] Oystercatcher (*Haematopus ostralegus*) [A130] Ringed plover (*Charadrius hiaticula*) [A137] Grey plover (*Pluvialis squatarola*) [A141] Knot (*Calidris canutus*) [A143] Sanderling (*Calidris alba*) [A144] Dunlin (*Calidris alpina*) [A149] Bar-tailed godwit (*Limosa lapponica*) [A157] Redshank (*Tringa totanus*) [A162] Black-headed gull (*Chroicocephalus ridibundus*) [A179] Roseate tern (*Sterna dougallii*) [A192] Common tern (*Sterna hirundo*) [A193] Arctic tern (*Sterna paradisaea*) [A194] Wetland and waterbirds [A999]	This coastal SPA is located 18km from the Proposed Project. It is downstream of the following watercourses crossed by the pipeline: Posseckstown Stream (WCX071), Ardrass Lower (WCX072), Reeves Stream (WCX074), River Liffey (WCX073), and the Grand Canal (WBX088). Surface water pathways exist. In the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for effects beyond the Liffey Estuary Lower and into the South Dublin Bay and River Tolka Estuary SPA. This SPA is located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project.	No potential for effects (no source-pathway-receptor)
North Bull Island SPA [004006]	S.I. No. 211/2010/ CO Version 1.0 (9 March 2015)					20km north-east	Light-bellied brent goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Teal (*Anas crecca*) [A052] Pintail (*Anas acuta*) [A054] Shoveler (*Anas clypeata*) [A056] Oystercatcher (*Haematopus ostralegus*) [A130] Golden plover (*Pluvialis apricaria*) [A140] Grey plover (*Pluvialis squatarola*) [A141] Knot (*Calidris canutus*) [A143] Sanderling (*Calidris alba*) [A144] Dunlin (*Calidris alpina*) [A149] Black-tailed godwit (*Limosa limosa*) [A156] Bar-tailed godwit (*Limosa lapponica*) [A157] Curlew (*Numenius arquata*) [A160] Redshank (*Tringa totanus*) [A162] Turnstone (*Arenaria interpres*) [A169] Black-headed gull (*Chroicocephalus ridibundus*) [A179] Wetland and waterbirds [A999]	This coastal SPA is located 20km from the Proposed Project. It is downstream of the following watercourses crossed by the pipeline: Posseckstown Stream (WCX071), Ardrass Lower (WCX072), Reeves Stream (WCX074), River Liffey (WCX073), and the Grand Canal (WBX088). Surface water pathways exist. In the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for effects beyond the Liffey Estuary Lower and into the North Bull Island SPA. This SPA is located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project.	No potential for effects (no source-pathway-receptor)
River Suck Callows SPA [004097]	S.I. No. 397/2012/ CO Version 1.0 (15 November 2022)					24km north	Whooper swan (*Cygnus cygnus*) [A038] Wigeon (*Anas penelope*) [A050] Golden plover (*Pluvialis apricaria*) [A140] Lapwing (*Vanellus vanellus*) [A142] Greenland white-fronted goose (*Anser albifrons flavirostris*) [A395] Wetland and Waterbirds [A999]	This SPA is crossed by the proposed Haul Roads. All proposed Haul Roads traverse through European sites along existing roads only and are built land. Potential risks associated with indirectly introducing/spreading INNS via contaminated soil/material on construction traffic were considered. The spread/introduction of INNS as a result of construction traffic leaving the Proposed Project and travelling away from site along the proposed Haul Roads will be avoided by the inclusion of standard best practice features (i.e. vehicular wheel wash down facilities adjacent to site entrances/exits) within the Proposed Project. Thus, it has been determined there is no potential that construction traffic movement along the Haul Roads to and from the Proposed Project would introduce/spread INNS to the River Suck Callows SPA. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects. This SPA is also protected for avian species that may be at risk of collision with construction traffic, which could result in mortality. Considering the Haul Roads are built land and are not suitable habitat for birds, the likelihood of construction traffic colliding with special conservation interest bird species is low. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no source-pathway-receptor)

European Site	Statutory Instrument (S.I.) / Conservation Objectives (CO) Version	Approximate Distances (km) from the Proposed Project Boundary to the European Site Boundary					Qualifying Interest(s)/Special Conservation Interest Species	Description of Potential for Likely Significant Effects from the Proposed Project (alone or in-combination, where relevant)	Possibility of Likely Significant Effects
		0-1km	1-5km	5-10km	10-15km	> 15km			
Baldoyle Bay SPA [004016]	S.I. No. 275/2010/ CO Version 1.0 (27 February 2013)					25km east	Light-bellied brent goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Ringed plover (*Charadrius hiaticula*) [A137] Golden plover (*Pluvialis apricaria*) [A140] Grey plover (*Pluvialis squatarola*) [A141] Bar-tailed godwit (*Limosa lapponica*) [A157] Wetland and waterbirds [A999]	This coastal SPA is located 25km from the Proposed Project. No disturbance, surface water or groundwater pathways exist due to the distance and changes in geology. Considering the distance from the Proposed Project, the nature of the Proposed Project, and the special conservation interests of this SPA, no source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Malahide Estuary SPA [004025]	S.I. No. 285/2011/ CO Version 1.0 (16 August 2013)					25km east	Great crested grebe (*Podiceps cristatus*) [A005] Light-bellied brent goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Pintail (*Anas acuta*) [A054] Goldeneye (*Bucephala clangula*) [A067] Red-breasted merganser (*Mergus serrator*) [A069] Oystercatcher (*Haematopus ostralegus*) [A130] Golden plover (*Pluvialis apricaria*) [A140] Grey plover (*Pluvialis squatarola*) [A141] Knot (*Calidris canutus*) [A143] Dunlin (*Calidris alpina*) [A149] Black-tailed godwit (*Limosa limosa*) [A156] Bar-tailed godwit (*Limosa lapponica*) [A157] Redshank (*Tringa totanus*) [A162] Wetland and waterbirds [A999]	This coastal SPA is located 25km from the Proposed Project. No disturbance, surface water or groundwater pathways exist due to the distance and changes in geology. Considering the distance from the Proposed Project, the nature of the Proposed Project, and the special conservation interests of this SPA, no source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Howth Head Coast SPA [004113]	S.I. No. 185/2012/ CO Generic Version 7.0 (29 October 2024)					26km east	Kittiwake (*Rissa tridactyla*) [A188]	This coastal SPA is located 26km from the Proposed Project. No disturbance, surface water or groundwater pathways exist due to the distance and changes in geology. Considering the distance from the Proposed Project, the nature of the Proposed Project, and the special conservation interests of this SAC, no source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Ireland's Eye SPA [004117]	S.I. No. 240/2010/ CO Generic Version 7.0 (12 November 2024)					29km east	Cormorant (*Phalacrocorax carbo*) [A017] Herring gull (*Larus argentatus*) [A184] Kittiwake (*Rissa tridactyla*) [A188] Guillemot (*Uria aalge*) [A199] Razorbill (*Alca torda*) [A200]	This coastal SPA is located 29km from the Proposed Project. No disturbance, surface water or groundwater pathways exist due to the distance and changes in geology. Considering the distance from the Proposed Project, the nature of the Proposed Project, and the special conservation interests of this SPA, no source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no pathway)
Lough Ree SPA [004064]	S.I. No. 456/2012/ CO Generic Version 9.0 (4 April 2025)					35km north	Little grebe (*Tachybaptus ruficollis*) [A004] Whooper swan (*Cygnus cygnus*) [A038] Wigeon (*Anas penelope*) [A050] Teal (*Anas crecca*) [A052] Mallard (*Anas platyrhynchos*) [A053] Shoveler (*Anas clypeata*) [A056] Tufted duck (*Aythya fuligula*) [A061] Common scoter (*Melanitta nigra*) [A065] Goldeneye (*Bucephala clangula*) [A067] Coot (*Fulica atra*) [A125] Golden plover (*Pluvialis apricaria*) [A140] Lapwing (*Vanellus vanellus*) [A142] Common tern (*Sterna hirundo*) [A193] Wetland and Waterbirds [A999]	This SPA is crossed by the proposed Haul Roads. All proposed Haul Roads traverse through European sites along existing roads only and are built land. Potential risks associated with indirectly introducing/spreading INNS via contaminated soil/material on construction traffic were considered. The spread/introduction of INNS as a result of construction traffic leaving the Proposed Project and travelling away from site along the proposed Haul Roads will be avoided by the inclusion of standard best practice features (i.e. vehicular wheel wash down facilities adjacent to site entrances/exits) within the Proposed Project. Thus, it has been determined there is no potential that construction traffic movement along the Haul Roads to and from the Proposed Project would introduce/spread INNS to the Lough Ree SPA. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects. This SPA is also protected for avian species that may be at risk of collision with construction traffic, which could result in mortality. Considering the Haul Roads are built land and are not suitable habitat for birds, the likelihood of construction traffic colliding with special conservation interest bird species is low. No source-pathway-receptor exists with the Proposed Project, and therefore no pathway for effects.	No potential for effects (no source-pathway-receptor)

6.2 Summary and Conclusions

838. The information presented in Section 3 to Section 5 (i.e. description of the Proposed Project, an overview of the receiving environment, and potential impacts) was used to establish source-pathway-receptors and the ZoI in the context of European sites. Potential Construction Phase and Operational Phase impacts as a result of the Proposed Project are summarised in Table 6.2 for European sites with a source-pathway-receptor link to the Proposed Project, and thus a possibility of likely significant effects as a result of the Proposed Project. These sites are illustrated on Figure 6.1.

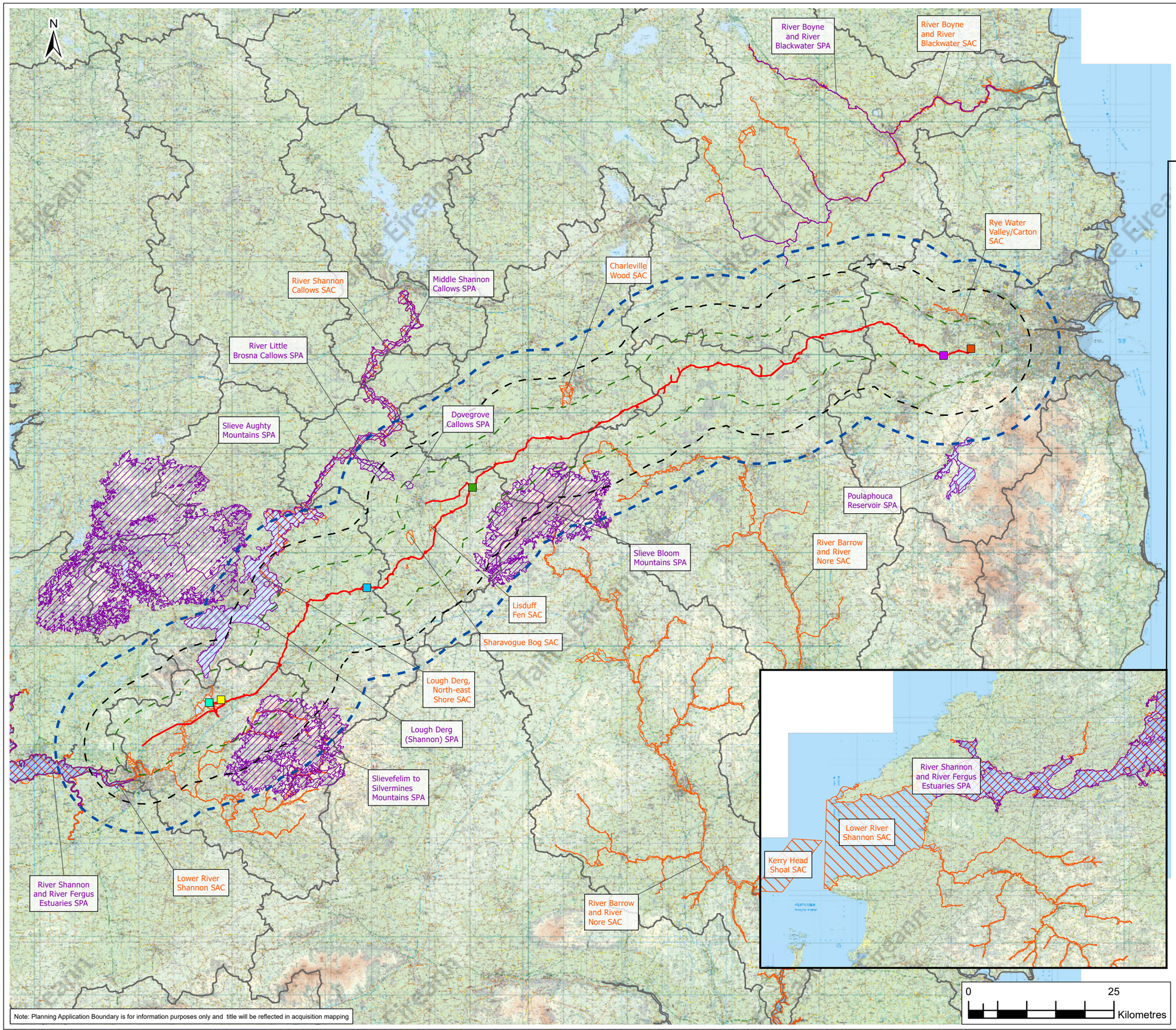
Table 6.2: Identified European Sites within the Zone of Influence (ZoI) and Potential (a) Construction (Including Testing and Commissioning) and (b) Operational Phase Impacts

European Site within the Zone of Influence (ZoI)	(a) Construction Phase Impacts								
	Habitat loss	Habitat Fragmentation	Habitat Degradation as a Result of Excavation and/or Tunnelling	Habitat Degradation as a Result of Hydrological Impacts	Habitat Degradation as a Result of Hydrogeological Impacts	Habitat Degradation as a Result of Air Quality Impacts	Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species	Disturbance/Displacement	Mortality Risk
Zone of Influence	Generally, within the footprint of the Proposed Project but can also result from extreme cases of habitat degradation (see herein)	Habitat areas or species ranges/territories through which the Proposed Project traverses.	Area within the Proposed Project footprint and up to 200m from where source-pathway-receptors occur within the Proposed Project.	Area within the Proposed Project footprint and any aquatic habitats downstream of any watercourse crossings or drainage outfalls and any aquatic species therein.	Area within the Proposed Project footprint and any aquatic/GWDTE habitats downgradient. Development within GWDTE zone of contribution and hydrogeological ZoI of groundwater dependent habitats and/or within 200m upgradient of the Proposed Project.	For indirect impacts in relation to dust effects during the Construction Phase, the ZoI was limited to sensitive ecological habitats within 50m of the Proposed Project (IAQM 2024). The ZoI with respect to impacts from air quality emissions from vehicles and heavy-duty vehicle movements was limited to sensitive receptors and relevant sensitive ecological habitats within 200m from road links, as per the TII PE-ENV-01106 guidance (TII 2022).	Potentially any habitats crossed by, immediately adjacent to, or downstream of the Proposed Project are at risk from contaminated soil/materials.	Area within the Proposed Project footprint and supporting habitat areas used by breeding and wintering birds within the Proposed Project. For indirect impacts, ZoI varies with species and type of impact: relevant factors include conservation status, sensitivity to disturbance and species core foraging distance, e.g. core foraging distance of hen harrier is 2km, with a maximum range of 10km (SNH 2016). Hardey *et al.* (2013) state that the average hunting range for a male hen harrier during breeding season is 7.3km.	Species foraging or commuting within the Proposed Project footprint or along the river corridors within the Lower Shannon catchment or within the House Derries Stream catchment.
Lower River Shannon SAC [002165]	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lisduff Fen SAC [002147]	—	—	✓	✓	✓	✓	✓	—	—
Sharavogue Bog SAC [000859]	—	—	✓	✓	✓	—	✓	—	—
River Barrow and River Nore SAC [002162]	—	—	✓	✓	✓	—	✓	—	—
Lough Derg, North-east Shore SAC [002241]	—	—	✓	✓	✓	—	✓	—	—
Rye Water Valley/Carton SAC [001398]	—	—	✓	✓	✓	—	✓	—	—
Charleville Wood SAC [000571]	—	—	✓	✓	✓	—	✓	—	—
River Boyne and River Blackwater SAC [002299]	—	—	✓	✓	✓	—	✓	—	—
River Shannon Callows SAC [000216]	—	—	✓	✓	✓	—	✓	—	✓
Slievefelim to Silvermines Mountains SPA [004165]	✓	✓	—	—	—	—	—	✓	—
Slieve Bloom Mountains SPA [004160]	✓	✓	—	—	—	—	—	✓	—
Lough Derg (Shannon) SPA [004057]	✓	✓	✓	✓	✓	—	✓	✓	—
Dovegrove Callows SPA [004137]	✓	✓	✓	✓	✓	—	✓	—	—
River Little Brosna Callows SPA [004086]	✓	✓	—	—	—	—	—	✓	—
River Shannon and River Fergus Estuaries SPA [004077]	—	—	✓	✓	—	—	✓	✓	—
Slieve Aughty Mountains SPA [004168]	✓	✓	—	—	—	—	—	✓	—
River Boyne and River Blackwater SPA [004232]	—	—	✓	✓	✓	—	✓	—	—

European Site within the Zone of Influence (ZoI)	(a) Construction Phase Impacts								
	Habitat loss	Habitat Fragmentation	Habitat Degradation as a Result of Excavation and/or Tunnelling	Habitat Degradation as a Result of Hydrological Impacts	Habitat Degradation as a Result of Hydrogeological Impacts	Habitat Degradation as a Result of Air Quality Impacts	Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species	Disturbance/Displacement	Mortality Risk
Poulaphouca Reservoir SPA [004063]	✓	✓	—	—	—	—	—	✓	—
Middle Shannon Callows SPA [004024]	—	—	✓	✓	✓	—	✓	—	—

European Site within the Zone of Influence (ZoI)	(b) Operational Phase Impacts					
	Hydrological Impacts	Introduction or Spread of Invasive Non-native Species	Disturbance/Displacement	Pollution Risk	Mortality Risk	Collision Risk
Zone of Influence	Aquatic habitats and species within the hydrological ZoI associated with the RWI&PS: – Upper limit on the River Shannon system - approximately 16km upstream of Lough Derg at Meelick Weir – Downstream limit on the River Shannon system - Old River Shannon and Tailrace confluence (tidal beyond this point). Potential receiving watercourse locations for Washouts along the length of the pipeline.	Area within the Proposed Project footprint.	Area within the Proposed Project footprint.	Area within the Proposed Project footprint.	Species foraging or commuting within the Proposed Project footprint.	Area where the 38 kV Uprate Works crosses the Lower River Shannon
Lower River Shannon SAC [002165]	✓	✓	✓	✓	✓	✓
Lisduff Fen SAC [002147]	✓	—	—	—	—	—
Sharavogue Bog SAC [000859]	✓	—	—	—	—	—
River Barrow and River Nore SAC [002162]	✓	—	—	—	—	—
Lough Derg, North-east Shore SAC [002241]	✓	—	—	—	—	—
Rye Water Valley/Carton SAC [001398]	✓	—	—	—	—	—
Charleville Wood SAC [000571]	✓	—	—	—	—	—
River Boyne and River Blackwater SAC [002299]	✓	—	—	—	—	—
River Shannon Callows SAC [000216]	✓	—	—	—	—	—
Slievefelim to Silvermines Mountains SPA [004165]	—	—	—	—	—	—
Slieve Bloom Mountains SPA [004160]	—	—	—	—	—	—
Lough Derg (Shannon) SPA [004057]	✓	—	—	—	—	—
Dovegrove Callows SPA [004163]	✓	—	—	—	—	—
River Little Brosna Callows SPA [004086]	—	—	—	—	—	—
River Shannon and River Fergus Estuaries SPA [004077]	—	—	—	—	—	—
Slieve Aughty Mountains SPA [004168]	—	—	—	—	—	—

European Site within the Zone of Influence (ZoI)	(b) Operational Phase Impacts					
	Hydrological Impacts	Introduction or Spread of Invasive Non-native Species	Disturbance/Displacement	Pollution Risk	Mortality Risk	Collision Risk
River Boyne and River Blackwater SPA [004232]	✓	—	—	—	—	—
Poulaphouca Reservoir SPA [004063]	—	—	—	—	—	—
Middle Shannon Callows SPA [004024]	✓	—	—	—	—	—



Legend

- Planning Application Boundary
- 15km Buffer from Planning Application Boundary
- 10km Buffer from Planning Application Boundary
- 5km Buffer from Planning Application Boundary
- WFD Catchments

Infrastructure Sites

- Raw Water Intake and Pumping Station
- Water Treatment Plant
- Break Pressure Tank
- Booster Pumping Station
- Flow Control Valve
- Termination Point Reservoir

European Sites

- Special Protection Area (SPA)
- Special Area of Conservation (SAC)

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
F03	19/11/25	Final - Planning Application	SP	LK	SN	SW

Jacobs TOBIN

Client: Uisce Éireann Irish Water; Tionscadal Soláthair Uisce Water Supply Project

Project: Water Supply Project
Eastern and Midlands Region

Drawing Title: Figure 6.1
European Sites Within the Zone
of Influence of the Proposed Project

Drawing Status: Final - Planning Application

Scale @ A3	1:630,000	DO NOT SCALE
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Client No.	9318	
Drawing No.	32105801/700/06	
File Path	W:\GIS\Projects\6909_DublinWaterSupplyProject\ArcGIS\0_6909_Maps\6909_DF3.5\6909_DF3.5.aprx	

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839. Following an examination, analysis and evaluation of the relevant information, including in particular the nature of the Proposed Project and its potential relationship with European sites, it is possible to rule out likely significant effects, alone or in-combination with other plans and projects (direct and indirect) on all European sites except for the following:

- Lower River Shannon SAC
- Lisduff Fen SAC
- Sharavogue Bog SAC
- River Barrow and River Nore SAC
- Lough Derg, North-east Shore SAC
- Rye Water Valley/Carton SAC
- Charleville Wood SAC
- River Boyne and River Blackwater SAC
- River Shannon Callows SAC
- Slievefelim to Silvermines Mountains SPA
- Slieve Bloom Mountains SPA
- Lough Derg (Shannon) SPA
- Dovegrove Callows SPA
- River Little Brosna Callows SPA
- River Shannon and River Fergus Estuaries SPA
- Slieve Aughty Mountains SPA
- River Boyne and River Blackwater SPA
- Poulaphouca Reservoir SPA
- Middle Shannon Callows SPA.

840. All other European sites are located beyond the ZoI and therefore, any likelihood of there being any significant effects on any other European sites as a result of the Proposed Project alone or in-combination with other plans and projects, may be excluded, on the basis of objective information set out in this report and there is no reasonable scientific doubt about that conclusion.

7. Assessment of Impacts on European Sites

841. This section of the NIS assesses the direct and indirect impacts of the Proposed Project with respect to the European sites which fall within the ZoI of the Proposed Project. In respect of each of these screened in European sites, the assessment below sets out the analysis of the potential impacts, the qualifying interests/special conservation interest species at risk of these potential impacts in view of the sites' conservation objectives (including their specific attributes, measures and targets) and the qualifying interests'/special conservation interest species' conservation condition[19]. Consideration was also given to undesignated habitats and species which are necessary to the conservation of the qualifying interests/special conservation interests of the European sites. The avoidance and design measures set out in Section 3.5 are considered in assessing the potential impacts. The mitigation measures which would be implemented are presented separately in this section of the report for each European site within the ZoI. This section also assesses any residual impacts from the Proposed Project for each of the European sites, concluding whether these would adversely affect the integrity of those sites. The assessment of impacts on European sites from the Proposed Project in-combination with any other plans or projects, is presented in Section 8.

7.1 Lower River Shannon SAC 2165

7.1.1 Qualifying Interests and Conservation Objectives of Lower River Shannon SAC 2165

842. The qualifying interest Annex I habitats and species of the Lower River Shannon SAC, and the overall conservation objective for each, are listed in Table 7.1.

Table 7.1: Qualifying Interests and Conservation Objectives of Lower River Shannon SAC (NPWS 2012a)

Qualifying Interests	Conservation Objectives
Annex I Habitats	
Sandbanks which are slightly covered by sea water all the time [1110]	To maintain favourable conservation condition
Estuaries [1130]	To maintain favourable conservation condition
Mudflats and sandflats not covered by seawater at low tide [1140]	To maintain favourable conservation condition
*Coastal lagoons [1150]	To restore favourable conservation condition
Large shallow inlets and bays [1160]	To maintain favourable conservation condition
Reefs [1170]	To maintain favourable conservation condition
Perennial vegetation of stony banks [1220]	To maintain favourable conservation condition
Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	To maintain favourable conservation condition
Salicornia and other annuals colonising mud and sand [1310]	To maintain favourable conservation condition
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	To restore favourable conservation condition
Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	To restore favourable conservation condition
Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	To maintain favourable conservation condition
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410]	To maintain favourable conservation condition
* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]	To restore favourable conservation condition

[19] In-combination effects are considered in Section 8 separately from the direct and indirect impacts discussed this section.

Qualifying Interests	Conservation Objectives
Annex II Species	
Freshwater pearl mussel (*Margaritifera margaritifera*) [1029]	To restore favourable conservation condition
Sea lamprey (*Petromyzon marinus*) [1095]	To restore favourable conservation condition
Brook lamprey (*Lampetra planeri*) [1096]	To maintain favourable conservation condition
River lamprey (*Lampetra fluviatilis*) [1099]	To maintain favourable conservation condition
Atlantic salmon (*Salmo salar*) (only in fresh water) [1106]	To restore favourable conservation condition
Common bottlenose dolphin (*Tursiops truncatus*) [1349]	To maintain favourable conservation condition
Otter (*Lutra lutra*) [1355]	To restore favourable conservation condition

843. Four of the Annex I habitats and four of the Annex II species have a 'restore favourable conservation condition' objective. The remainder have a 'maintain favourable conservation condition' objective. Section 7.1.1 to Section 7.1.6 provide details on the qualifying interests and the conservation objectives, summarises the baseline description, and assesses the potential direct and/or indirect impacts associated with the Proposed Project which may affect the conservation objectives of any of the qualifying interest habitats or species of the Lower River Shannon SAC. A separate report in Appendix K ('Restore Favourable Conservation Condition' Objective for the Lower River Shannon Special Area of Conservation) seeks to further demonstrate how none of the direct or indirect impacts associated with the Proposed Project would affect, in particular, the 'restore' objectives, i.e. it demonstrates how the Proposed Project would not impede the ability to restore any of the conservation objectives for the Lower River Shannon SAC.

844. There are no groundwater-dependent qualifying interests in the Lower River Shannon SAC. The majority of the pipeline is underlain by poorly productive aquifers. The Nenagh GWB, Silvermines Gravels GWB, Lismaline GWB, Geashill GWB and Shinrone GWB contribute groundwater to rivers that discharge to the Lower River Shannon SAC.

7.1.2 Ecological Baseline Description for Lower River Shannon SAC 2165

7.1.2.1 General Overview

845. This very large European site stretches along the Shannon valley from Killaloe in County Clare to Loop Head/Kerry Head, a distance of approximately 120km. The site thus encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. Rivers within the sub-catchment of the Feale include the Galey, Smearlagh, Oolagh, Allaughaun, Owveg, Clydagh, Caher, Breanagh and Glenacarney. Rivers within the sub-catchment of the Mulkear include the Killeenagarriff, Annagh, Newport, the Dead River, the Bilboa, Glashacloonaraveela, Gortnageragh and Cahernahallia (DAHG 2013a).

846. The Shannon and Fergus Estuaries form the largest estuarine complex in Ireland. They form a unit stretching from the upper tidal limits of the Shannon and Fergus Rivers to the mouth of the Shannon Estuary. Both the Fergus and inner Shannon Estuaries feature vast expanses of intertidal mudflats, often fringed with saltmarsh. Plant species are typically scarce on the mudflats, although there are some eelgrass (*Zostera* spp.) beds and patches of green algae (e.g. *Ulva* sp. and *Enteromorpha* sp.). The main macro-invertebrate community which has been noted from the inner Shannon and Fergus estuaries is a *Macoma-Scrobicularia-Nereis* community. In the transition zone between mudflats and saltmarsh, specialised colonisers of mud predominate. For example, swards of Common Cord-grass (*Spartina anglica*) frequently occur in the upper parts of the estuaries. Saltmarsh vegetation frequently fringes the mudflats. The dominant type of saltmarsh present is Atlantic salt meadow occurring over mud. Characteristic species occurring include common saltmarsh-grass (*Puccinellia maritima*), sea aster

(*Tripolium pannonicum*), thrift (*Armeria maritima*), sea-milkwort (*Lysimachia maritima*), sea plantain (*Plantago maritima*), red fescue (*Festuca rubra*), creeping bent (*Agrostis stolonifera*), saltmarsh rush (*Juncus gerardi*), long-bracted sedge (*Carex extensa*), lesser sea-spurrey (*Spergularia marina*) and sea arrowgrass (*Triglochin maritima*). Two scarce species are found on saltmarshes in the Fergus estuary: a type of robust saltmarsh-grass (*Puccinellia foucaudii*), sometimes placed within the species common saltmarsh-grass and hard-grass (*Parapholis strigosa*) (DAHG 2013a).

847. The site supports an excellent example of a large shallow inlet and bay. Littoral sediment communities in the mouth of the Shannon Estuary occur in areas that are exposed to wave action and also in areas extremely sheltered from wave action. Other coastal habitats that occur within the site include stony beaches and bedrock shores (these support a typical zonation of seaweeds such as *Fucus* spp., *Ascophyllum nodosum* and kelps), shingle beaches (with species such as sea beet, sea mayweed - *Matricaria maritima*, sea campion and curled dock - *Rumex crispus*), sandbanks which are slightly covered by sea water at all times (e.g. in the area from Kerry Head to Beal Head) and sand dunes (a small area occurs at Beal Point, where marram – *Ammophila arenaria* is the dominant species) (DAHG 2013a).

848. Freshwater rivers have been included in the site, most notably the Feale and Mulkear catchments, the Shannon from Killaloe to Limerick (along with some of its tributaries, including a short stretch of the Kilmastulla River), the Fergus up as far as Ennis, and the Cloon River. These systems are very different in character: the Shannon is broad, generally slow flowing and naturally eutrophic, the Fergus is smaller and alkaline, while the narrow, fast-flowing Cloon is acid in nature (DAHG 2013a).

849. Semi-natural habitats, such as wet grassland, wet woodland and marsh occur by the rivers, but improved grassland is the most common habitat type. One grassland type of particular conservation significance, *Molinia* meadows, occurs in several parts of the European site and the examples at Worldsend on the River Shannon are especially noteworthy (DAHG 2013a). However, no '*Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410]', which is a qualifying interest habitat of the Lower River Shannon SAC, was recorded within the study area for the Proposed Project. The nearest mapped area of *Molinia* meadows is located approximately 1.2km south of the Proposed Project at its closest point, in Pollagh, County Tipperary.

850. Floating river vegetation characterised by species of water-crowfoot (*Ranunculus* spp.), pondweeds (*Potamogeton* spp.) and the moss *Fontinalis antipyretica* are present throughout the major river systems within this European site (DAHG 2013a). The full distributions of this habitat and its sub-types in this European site are currently unknown. The closest known area of floating river vegetation in the Lower River Shannon SAC is located approximately 17km south of the Proposed Project in the River Shannon at Kings Island near Limerick city, south of the Ardnacrusha Generating Station. Potential sub-types of this habitat type including triangular club-rush (*Schoenoplectus triqueter*) and opposite-leaved pondweed (*Groenlandia densa*) are not present in Parteen Basin, though are likely to occur on the Old River Shannon downstream of Parteen Weir.

851. Alluvial woodland occurs on the banks of the Shannon and on islands in the vicinity of the University of Limerick. The most prominent woodland type is gallery woodland where white willow (*Salix alba*) dominates the tree layer with occasional alder. The shrub layer consists of various willow species with rusty willow (*Salix cinerea* ssp. *oleifolia*) and what appear to be hybrids of *S. alba* x *S. viminalis* (DAHG 2013a). No 'Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]', which is a qualifying interest priority habitat of the Lower River Shannon SAC, was recorded within or in the ZoI of the Proposed Project. The nearest mapped area of alluvial woodland is located approximately 3km west of the Proposed Project at its closest point, along the Ardcloony River west of Parteen Basin in Ballycorney, County Clare. Some areas of woodland which may conform to alluvial woodland exist immediately downstream of the bridge at Ballina/Killaloe (approximately 2km north, and upstream, of the Proposed Project); however, it is currently not mapped by NPWS.

7.1.2.2 Habitats

852. As described in Section 2.2.1, the Old River Shannon is tidal at its confluence with the Tailrace, therefore the water level would not be impacted by changes upstream. The confluence therefore forms the lower limit of the hydrological ZoI on the Tailrace and the Old River Shannon. The proposed RWI&PS site is situated downstream of Lough Derg, which limits the ZoI of water quality impacts to that portion of the Lower River Shannon SAC downstream of the RWI&PS. Any pollution event that may occur would be expected to be minor in comparison to the dilution factor and assimilation capacity of Parteen Basin and the River Shannon, or to be no more than temporary in nature. Given the aforementioned evidence, any pollution event would not have any precipitable or far-reaching effects within the catchment. Thus, the following qualifying interest habitats do not occur within the ZoI of the Proposed Project and are therefore not discussed in detail below: Sandbanks which are slightly covered by sea water all the time [1110], Estuaries [1130], Mudflats and sandflats not covered by seawater at low tide [1140], Coastal lagoons [1150], Large shallow inlets and bays [1160], Reefs [1170], Perennial vegetation of stony banks [1220], Vegetated sea cliffs of the Atlantic and Baltic coasts [1230], *Salicornia* and other annuals colonising mud and sand [1310], Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330], Mediterranean salt meadows (*Juncetalia maritimi*) [1410], *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410].

7.1.2.2.1 Raw Water Intake and Pumping Station and 38 kV Uprate Works Footprint

853. As noted, the Proposed Project overlaps in part with the Lower River Shannon SAC in three locations: the RWI&PS site, where the 38 kV Uprate Works crosses the Lower River Shannon, and where the two underground cable ducts laid in the R494 from Birdhill to the entrance of the RWI&PS access road (to facilitate power supply to the RWI&PS) cross the Kilmastulla River.

854. At the 38 kV Uprate Works site and the power supply to the RWI&PS approximately 1.55ha of terrestrial habitats lie within the Lower River Shannon SAC. Habitats recorded included: wet grassland (GS4), (mixed) broadleaved woodland (WD1), building and artificial surfaces (BL3), spoil and bare ground (ED2), and treelines (WL2). Aquatic habitats including drainage ditches (FW4) and depositing/lowland rivers (FW2) (i.e. where the line crosses the Lower River Shannon between polesets 66B and 67B and at WCX077) were also recorded. The Lower River Shannon is approximately 200m wide at the crossing, while the Kilmastulla River is approximately 8m wide. At the Lower River Shannon, treelines were recorded on the banks consisting of common species such as ash, hawthorn, blackthorn (*Prunus spinosa*) and willow sp. There were no protected species noted, such as otter or kingfisher, although such species would very likely use the river for foraging and commuting. At the Kilmastulla River, building and artificial surfaces (BL3) and spoil and bare ground (ED2) habitats were recorded along the banks (associated with the Killaloe Bypass, Shannon Bridge Crossing and R494 Improvement Scheme).

855. At the RWI&PS site approximately 1.4ha of the Proposed Project area lies within the Lower River Shannon SAC; 0.6ha of which is aquatic habitat in the waters of Parteen Basin and 0.8ha of which is terrestrial habitat on the eastern bank of Parteen Basin. The woodland habitat within the footprint of the RWI&PS and within the boundaries of the SAC (i.e. the 0.8ha) is not alluvial woodland, or any qualifying interest habitat for the Lower River Shannon SAC. It conforms to mixed deciduous conifer woodland (WD2) that is gradually reverting to ash-hazel woodland (Appendix H: Parteen Basin Habitat Assessment June 2016; Appendix I: Assessment of the Woodland Near Parteen Weir; and EIAR Appendix A8.4: Targeted Habitat Surveys). It is an old conifer plantation, largely wind-thrown, in which native species have become established. The land is elevated about 1m above the height of the adjacent reservoir and is more or less level but uneven, with cultivation ridges, probably dating from the time of planting of the conifers. The conifers are probably about 40 years old. The understorey is virtually absent, with the exception of common tamarisk-moss (*Thuidium tamariscinum*) and ivy (*Hedera helix*). A row of mature oak (*Quercus* sp.) occurs along the western edge of the conifer plantation. The canopy of the mixed woodland is dominated by rusty willow, hazel, and Sitka spruce. There is a high level of ivy cover on the

mature trees, with honeysuckle (*Lonicera periclymenum*) also present on trees and in the ground layer. The ground layer is dominated by enchanter's-nightshade (*Circaea lutetiana*), wood-sorrel, scaly male-fern (*Dryopteris affinis*), broad buckler-fern (*Dryopteris dilatata*), and soft shield fern (*Polystitchum setiferum*). Other species present included herb robert (*Geranium robertianum*), ash saplings, false-brome (*Brachypodium sylvaticaum*), bramble (*Rubus fruticosus* agg.), common tamarisk-moss, and yellow pimpernel (*Lysmachia nemorum*). Data from the vegetation relevé recorded from this site are presented in Table 7.2 and in EIAR Appendix A8.4: Targeted Habitat Surveys.

Table 7.2: Data from the Vegetation Relevé (Quadrat) Recorded at the Raw Water Intake site in August 2020 (see EIAR Appendix A8.4: Targeted Habitat Surveys)

Species Latin Name	Species English Name	Species Cover (Domin[a])
Thuidium tamarscinum	Common tamarisk-moss	8
Salix cinerea subsp. oleifolia	Rusty willow	7
Picea sitchensis	Sitka spruce	6
Dryopteris dilatata	Broad buckler-fern	6
Corylus avellana	Hazel	5
Hedera helix	Ivy	5
Oxalis acetosella	Wood-sorrel	5
Lonicera periclymenum	Honeysuckle	4
Circaea lutetiana	Enchanter's-nightshade	4
Dryopteris affinis	Scaly male-fern	4
Climacium dendroides	Tree moss	4
Rubus fruticosus agg.	Blackberry	3
Brachypodium sylvaticum	False-brome	3
Polystitchum setiferum	Soft shield fern	3
Fraxinus excelsior	Ash	2
Quercus robur	Pedunculate oak	2
Geum urbanum	Wood avens	2
Lysimachia nemorum	Yellow pimpernel	2
Crataegus monogyna	Hawthorn	1
Hypericum adrosaemum	Tutsan	+
Geranium robertianum	Herb-robert	+
Lathyris sp.	—	+

Note:
[a] Domin scale of cover of abundance was used as follows:
+: 1 individual, no measurable cover; 1: <4% cover, with few individuals; 2: <4% cover, with several individuals; 3: <4% cover, with many individuals; 4: 4-10% cover; 5: 11-25% cover; 6: 26-33% cover; 34-50% cover; 8: 51-75% cover; 9: 76-90% cover; 10: 91-100% cover.

856. As mentioned, a scuba survey of the aquatic environment in the study area of the proposed RWI&PS was undertaken in August 2017, August 2019, June 2021 and August 2024 (EIAR Appendix A8.17: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2017), EIAR Appendix A8.18: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2019), EIAR Appendix A8.19 (Aquatic Invasive Species Survey (June 2021) Report) and EIAR Appendix A8.23 (Aquatic Invasive Species and Macrophyte Survey at Lough Derg and Parteen Basin)). The shore in the footprint of the proposed Intake Chamber was found to be gently shelving with the upper shore comprising cobble and gravel (Image 7.1). This profile was relatively uniform both upstream and downstream of the RWI&PS site. The lake bed gently dipped to a depth of approximately 5m at a distance of 50m offshore. At about 1m depth of water, the substrate changed from cobble and gravel to a silty,

sandy gravel with scattered cobble and small boulder. This continued to a depth of approximately 2.5m where it became a silty sand, while from 3m and deeper it comprised a fine silt.



Image 7.1: Shoreline in the Footprint of the RWI&PS site at Parteen Basin

857. The shallow upper shore zone (to approximately 0.5m) had cobbles covered with krustenstein – a blue-green algal crust associated with oligotrophic alkaline waters. The substrate had a dense covering of horned pondweed with small amounts of stonewort (Image 7.2). Greater water-moss was present, though primarily confined to the roots of fringing trees that are exposed on the lake shore. The truly aquatic *Fontinalis antipyretica*, considered a characteristic species of '*Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation*', is an aquatic generalist that can be found from some metres depth in lakes to periodically inundated areas, or just above it (Lockhart *et al.* 2012). *Fontinalis antipyretica* is very common in lakes as well as in rivers. However, floating river vegetation habitat is largely confined to rivers. Furthermore, Parteen Basin is also classified as a HMWB (Reservoir FL7) and is subject to much more variation in level than a natural lake. Although it is considered a characteristic species of '*Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation*', its presence is not considered an indicator of the presence of this Annex I habitat, i.e. this Annex I habitat is not present within the Proposed Project. The invasive non-native zebra mussel was occasional in small quantities on cobbles. In water from 1.0 to 1.5m in depth, small amounts of stonewort were present, though much of it appeared to be unrooted drift material. Yellow water lily and the submerged form of bulrush were occasional to frequent, and the submerged form of arrowhead formed isolated dense stands. Both shining pondweed and perfoliate pondweed occurred in small amounts along with Nuttall's waterweed. Cobbles still retained some krustenstein cover along with small amounts of zebra mussel.



Image 7.2: Shallow Water with Horned Pondweed, Stonewort, and Krustenstein in the Footprint of the RWI&PS site at Parteen Basin

858. In water from 1.5m to 2.5m in depth, both bulrush and arrowhead formed dense stands with occasional clumps of yellow waterlily (Image 7.3). The bulrush formed emergent reed beds while the arrowhead remained in submerged form. Both dominant species thinned out towards 3.0m depth and small amounts of ivy-leaved duckweed occurring on the lake bed. No macrophytes were recorded below 3.5m (euphotic depth) though zebra mussels were recorded in small amounts to 5m in depth, forming dense aggregations on hard substrate.

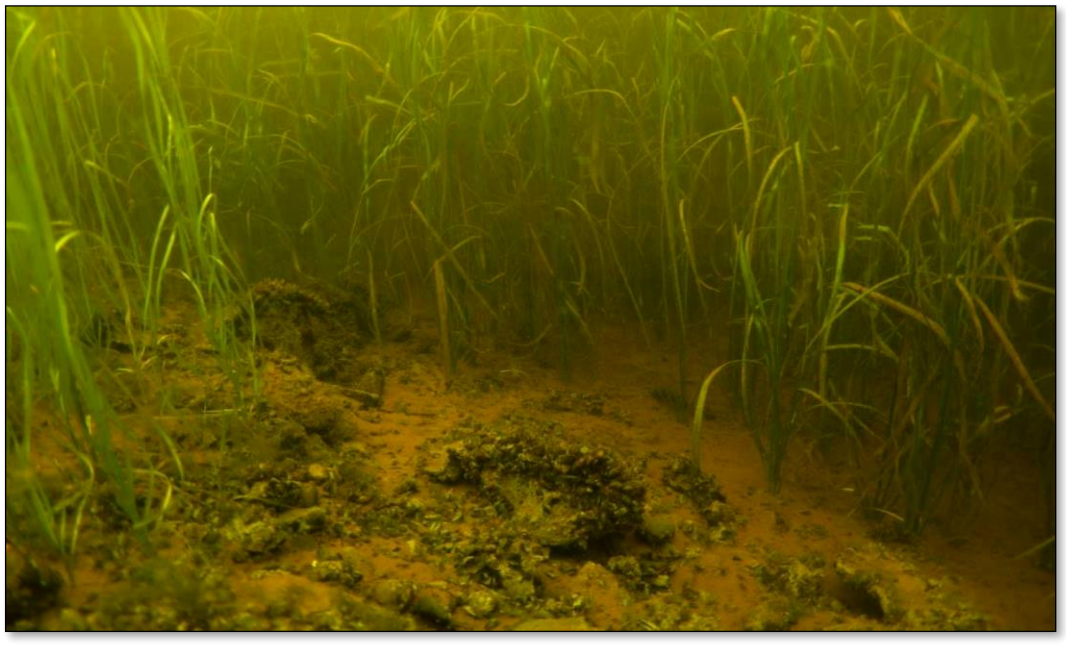


Image 7.3: Beds of Bulrush and Arrowhead with Zebra Mussel in Approximately 3m Depth in the Footprint of the RWI&PS Site at Parteen Basin

7.1.2.3 Species

859. The following qualifying interest species do not occur within the ZoI of the RWI&PS and are therefore not discussed in detail below; freshwater pearl mussel [1029] and bottlenose dolphin [1349]. Freshwater pearl mussel occur in parts of the Cloon River in County Clare, which is in a separate sub-catchment to the Proposed Project, and bottlenose dolphin occur in the marine environment only, which is beyond the lower limit of the hydrological ZoI.

7.1.2.3.1 Fish

860. Five species of fish listed on Annex II of the Habitats Directive are found within the Lower River Shannon SAC and the ZoI of the Proposed Project (four of which are listed as qualifying interests; see Table 7.1). These are sea lamprey, brook lamprey, river lamprey, twaite shad and Atlantic salmon.

- Sea lamprey grow to maturity in the sea and migrate to freshwater to spawn. They migrate through the estuary from the sea in April and May and spawn in rivers in late May or June and then return to sea (Hardisty 1969). The Lower Shannon area is known as an important location for sea lamprey (Kurz and Costello 1999; Igoe *et al.* 2004). A review of the NBDC 10km national grid squares indicates the presence of sea lamprey in the Lower Shannon and its tributaries (NBDC 2025). Many sea lamprey locations are along main river reaches immediately downstream of weirs, where they can be seen spawning at high densities and are easily observed (Igoe *et al.* 2004). The main spawning areas for this species in the Lower Shannon catchment are in the River Shannon at Plassey and at Castleconnell, and in the River Mulkear at Annacotty. This species has also been reported to spawn in the bottom reaches of the Kilmastulla River and was observed spawning in the Shannon at Parteen Basin (Kurz and Costello 1999; Igoe *et al.* 2004)
- River lamprey grow to maturity in estuaries and migrate to freshwater to spawn from October to December (Maitland 2003). Spawning occurs in the rivers in March and April. Between July and September young adults at 3-5 years of age migrate during darkness to the estuary. A review of the NBDC 10km national grid squares found no records of this species in the Lower Shannon or its tributaries (NBDC 2025). On account of their smaller size, adult river lamprey are less obvious than sea lamprey to the naked eye, and less information is available on their distribution; however, important populations are known to occur in the River Mulkear and in the lower reaches of the River Shannon and populations have been identified in the Owenslieve_020 River in County Clare (flows into the Shannon Estuary downstream of Limerick City) (Igoe *et al.* 2004). It is likely that they occur in most rivers that allow access to spawning and nursery areas from the sea
- Brook lamprey are non-anadromous, i.e. they do not migrate up rivers from the sea to spawn. They are the most widespread of the three lamprey species and are known to be common in the Lower Shannon catchment (Kurz and Costello 1999)
- Atlantic salmon are an anadromous fish that begin their life cycle in freshwater and migrate to sea to feed and grow and then return to freshwater to spawn. Smolts typically head out to sea between March and June and adults return to the river between March and August (Marine Institute 2020). There are a number of rivers, which flow into the Shannon Estuary, which are fished for Atlantic salmon. These include the River Fergus, Castleconnell Salmon Fishery, River Mulchair, River Maigue and River Deel. The Fergus is important in its lower reaches for spring salmon, while the Mulkear catchment excels as a grilse fishery, though spring fish are caught on the actual Mulkear River. The Feale is important for both types
- As previously mentioned, the preferred habitat for twaite shad is estuarine or coastal waters but it comes into the lower reaches of rivers for spawning from May to June. Twaite shad is not thought to spawn within the Lower River Shannon SAC (DAHG 2013a).

861. Fish stock surveys were carried out within Lough Derg and Parteen Basin in June and July 2016. These surveys were carried out by IFI as part of their National Research Survey Programme and were supported by Uisce Éireann (Kelly *et al.* 2017a; 2017b).

862. The fish stock data compiled for Lough Derg from the 2016 survey generally lie within the expected ranges for all species for a large Irish lake of this type regarding stock density, stock structure and growth terms. Eight fish species and one type of hybrid were recorded in the fish stock survey on Lough Derg between 13 June and 5 July 2016 (Minchin 2016). Overall perch, roach, roach x bream hybrids and brown trout were the most abundant fish species (catch per unit effort) and roach x bream hybrids followed by roach and perch were the most abundant fish species in terms of biomass (biomass per unit effort) captured in the survey gillnets. One unexpected result was the failure of recruitment of juvenile pike to the fishery over the last three years. Pike ranging from 0+, 1+ and 2+ years are not a significant feature of the survey sample in 2016. This is believed to be a very rare incident, with only one known example in Lough Corrib where juvenile pike were being actively removed by IFI staff as part of a fishery management programme. In contrast to Lough Derg, however, the pike stock in the Parteen Basin samples were dominated by young fish (≤ 2+ years old), suggesting that Parteen Basin may be important for recruitment of this species in the entire lake system. Juvenile pike (≤ 2+ years of age) use charophyte beds, of which there are extensive colonies in the shallow (≤ 3.0 m) sheltered areas along the western shores of both Lough Derg and Parteen Basin. The reason as to why pike production has continued in Parteen Basin and not in Lough Derg, when the nursery habitat is still present in both waters, cannot be discerned from the current information available. A review of the percentage length frequency distribution for adult pike in the Lough Derg survey (Minchin 2016) suggests a high level of variation in the recruitment rates of juvenile pike to the adult stock over the last 15 years.

863. The fish stock survey data results for Parteen Basin are notably different to those recorded for Lough Derg. Parteen Basin, unlike Lough Derg, is a HMWB. However, both Parteen Basin and Lough Derg are subject to regular fluctuations in water level, although the upper and lower water levels that ESB applies to Parteen Basin are wider than Lough Derg (Section 4.1.1). Parteen Basin is also relatively deep and unproductive along its eastern shoreline. In Parteen Basin, perch was found to be the dominant species in term of abundance (catch per unit effort) and roach was the dominant fish species in terms of biomass (biomass per unit effort) captured in the 2016 survey gill nets. One individual Atlantic salmon (measured at 75cm) was recorded in the pelagic zone of Parteen Basin. All fish species recorded here were dominated by juvenile stocks and the overall biomass values for all species were lower than those recorded in Lough Derg. It is noteworthy that no pollan were recorded in the Parteen Basin survey which is not unexpected given the artificial nature of the habitat. No lamprey species were recorded in the Parteen Basin survey also; however, this is not unexpected considering the requirements associated with their unique life history. Adult lamprey typically spawn in gravel/cobble substrate, building a discrete nest in which the eggs are laid. After hatching, the larvae (ammocoetes) settle in silt/sand substrate, where they assume a largely sedentary lifestyle. As previously noted, an aquatic ecological survey using scuba was undertaken at the Parteen Basin RWI&PS site (additional effort to the IFI fish stock surveys; Minchin and Boelens 2017). This included a series of 15cm cores in soft substrates to check for lamprey ammocoetes. Soft sediments were only present at depths from approximately 2 to 3.5m. No ammocoetes were retrieved from any of the cores taken (in 2017 or 2019) and there was no visible evidence recorded of ammocoete burrows in any of the soft sediments. Furthermore, no suitable spawning habitat for salmon was found during the aquatic ecological survey at the RWI&PS site. The nearest suitable spawning habitat to Parteen Basin for salmon is approximately 5km upstream of Killaloe in the Annacarriga River. However, the beds of bulrush and arrowhead recorded in the footprint of the RWI&PS site, provide potential spawning habitat for various coarse fish species (Minchin and Boelens 2017).

864. Currently there is a ‘Borland-McDonald’ fish lock at Ardnacrusha station and a ‘pool-traverse fish pass’ at Parteen regulating weir. These both accommodate the upstream and downstream movement of fish. Fish migration may be hindered or delayed due to the existence of hydro stations and their associated fish passes because the species of fish monitored and structural design of the fishways have strong implications for both attraction and passage performance (e.g. Noonan *et al*. 2011, Brunt *et al*. 2012).

7.1.2.3.2 Otter

865. Evidence of otter activity (spraints, trails, couches, tracks, or slides) were recorded along the western and south-eastern shore of Parteen Basin and along the Kilmastulla River during the field surveys in November 2016 and June 2017 (EIAR Figure 8.164 and Figure 8.165); however, no signs of otter activity were recorded within the study area of the RWI&PS site, 38 kV Uprate Works site, or the power connection to the RWI&PS during the surveys and there was no evidence of any holts or couches. No evidence of otter was recorded in more recent surveys (October 2024).

Table 7.3: Otter Holts/Activity Recorded

Feature	Status and Description
Spraint	Spraint on footbridge along the ESB embankment on the eastern shore of Parteen Basin. >1km from the Proposed Project
Holt	Located on the western shore of Parteen Basin. One main entrance and one secondary entrance. Well worn – muddy at the entrance. Otter signs (couch) surrounding the holt. >2km from the Proposed Project
Slide and potential couch site	Active slide and potential couch along the western shore of Parteen Basin. >1km from the Proposed Project
Holt	Located on the western shore of Parteen Basin in the bank. >1km from the Proposed Project
Track and potential couch site	A track/trail across a hedgerow and a potential couch at the water's edge on the western shore of Parteen Basin. c.950m from the Proposed Project
Track	Well-worn and used track/trail adjacent to the Kilmastulla River. c.545m from the Proposed Project

7.1.3 Examination and Analysis of Potential Direct and Indirect Impacts

7.1.3.1 Construction Phase

7.1.3.1.1 Habitat Loss and Fragmentation

866. The Proposed Project was designed to avoid/minimise direct impacts on habitat areas within the Lower River Shannon SAC, where possible. These include the siting and design of the RWI&PS which avoids any direct impacts on qualifying interest Annex I habitat within the Lower River Shannon SAC and the selection of a bankside design for the RWI, for which the intake of water occurs at the bank of the water body via Intake Chambers positioned below ground level, rather than in Parteen Basin. The intake structure would, however, require the removal of a length of the shoreline for the Passive Intake Screens, as well as the removal of the reservoir bed where concrete revetment mats would extend out from the intake to prevent bed scour. The concrete revetment mats (a flexible mat of meshed thin concrete segments with voids) would be provided with a small cover layer of clean granular or other native bed material (approximately 300mm) to provide a surface, which can be recolonised by native flora and fauna. Given the intake volume and rate, the flow in the area of the concrete revetment mats was calculated to be <0.3m/s, which is a low enough velocity to not cause the clean granular or other native bed material to be washed away, thereby allowing recolonisation to occur. The proposed bankside configuration design requires a lesser extent of works on the bed of Parteen Basin during the Construction Phase in comparison to that which would have been required for an 'in-basin' design. It remains however, that the Proposed Project includes habitat areas within the Lower River Shannon SAC at two locations (i.e. the RWI&PS site and the 38 kV Uprate Works site), as detailed in Section 3.

867. The overlap of the Proposed Project with the Lower River Shannon SAC covers an area of approximately 1.48ha at the RWI&PS site and 1.55ha at the 38 kV Uprate Works site and power connection to the RWI&PS. None of the habitats within the footprint of the RWI&PS (which includes the Intake Chambers), 38 kV Uprate Works, or power connection to the RWI&PS conform with any of the habitats listed as qualifying interest habitats of the Lower River Shannon SAC. The Proposed Project would, however, result in a temporary disturbance (up to 12 months) of 0.6ha of aquatic habitat in Parteen Basin during the construction of the Intake Chamber (i.e. the section of Parteen Basin within the boundaries of the Proposed Project, which includes the area required for the secant piles, temporary piling platform, and concrete revetment mats). After the Intake Chamber has been constructed and the secant piles have been removed there would continue to be a temporary habitat disturbance of aquatic habitat in Parteen Basin over the concrete revetment mats while the native bed material placed on top of the panels becomes established and flora and fauna begin to recolonise the area. While there was no suitable Atlantic salmon or lamprey spawning habitat recorded within the study area of the RWI&PS and no records of lamprey ammocoetes, it is expected these recolonised areas could revert to providing food and cover for a range of fish species including Atlantic salmon and lamprey. In addition to the temporary loss of aquatic habitat there would also be a temporary loss of 0.25ha of woodland habitat (oak-ash-hazel (WN2) and mixed deciduous conifer (WD2)) on the shore of Parteen Basin and an additional 0.55ha of mixed deciduous conifer woodland would be permanently lost. A temporary loss of 0.55ha of wet grassland (GS4) habitat with some disturbance to buildings and artificial surfaces habitat (BL3) and spoil and bare ground (ED2) associated with the 38 kV Uprate Works and power connection to the RWI&PS would also occur. None of these habitats are qualifying interest habitats of the Lower River Shannon SAC.

868. The loss of any habitat areas outside of the Lower River Shannon SAC would not have any indirect impacts on qualifying interest habitats or habitats supporting qualifying interest species, due to the absence of any impact pathways – i.e. the habitats lost outside of this European site do not provide a supporting role to any qualifying interest habitats within the Lower River Shannon SAC, nor to qualifying interest species. Similarly, loss of non-qualifying interest habitats within the Lower River Shannon SAC boundary would not have any indirect impacts on qualifying interest habitats due to the absence of any impact pathways – i.e. the non-qualifying interest habitats lost within the European site do not provide a supporting role to any qualifying interest habitats. Therefore, loss of habitat/fragmentation would not affect the conservation attributes and targets supporting the conservation condition of any of the qualifying interest habitats of the Lower River Shannon SAC.

7.1.3.1.1.1 Fish

869. The function of Parteen Basin for sea lamprey, brook lamprey, river lamprey and Atlantic salmon in the footprint of the RWI&PS is primarily as a migration corridor between the Shannon Estuary and spawning areas upstream in the catchment. Habitat loss relating to Parteen Basin is restricted to one 0.6ha section of aquatic habitat and 960m of shoreline that would be temporarily and permanently lost, respectively, in order to construct the intake structure. Habitats within and in the study area of the RWI&PS are not suitable spawning habitat for Atlantic salmon or lamprey species and therefore habitat loss associated with such works would have no effect on the species' ability to maintain their population within the catchment.

870. Bankside and riparian habitat loss or modification associated with the construction of the RWI&PS would not give rise to any adverse effects on the integrity of the Lower River Shannon SAC, with regard to its conservation objectives and the attributes and targets for sea lamprey, brook lamprey, river lamprey and Atlantic salmon.

871. The trenchless crossings of the Kilmastulla River (WCX007 and WCX001) associated with the 20 kV cable crossing for power supply to the RWI&PS and the power connection to the WTP, will avoid any instream works and associated habitat loss/fragmentation. Furthermore, the launch and reception shafts

would be situated outside of the riparian zone, as standard practice, therefore buffer strips of natural uncleared vegetation shall be preserved between construction activity and the watercourse crossing.

7.1.3.1.1.2 Otter

872. As there are no otter breeding or resting places, holt or couch sites present within the ZoI of the RWI&PS, 38 kV Uprate Works, or power connection to the RWI&PS and WTP, habitat loss would not result in any decline in the number of available holt or couch sites within the Lower River Shannon SAC.

873. Otter habitat is defined as a 10m zone of riparian habitat along a riverbank (NPWS 2009). At Parteen Basin, the construction of the RWI&PS would result in the permanent loss of approximately 960m^2 of otter terrestrial habitat on the eastern shore of Parteen Basin and a temporary habitat disturbance (up to 12 months) of approximately 0.6ha of otter aquatic habitat within Parteen Basin.

874. Habitat disturbance (temporary) and habitat loss of such a comparatively small scale in the context of the available riparian habitat resource around the shore of Parteen Basin (which is a small proportion of otter habitat available in the wider Lower River Shannon SAC – i.e. less than 0.01% of the total 985.9ha of terrestrial habitat or less than 0.45% of the total 125.6ha of lake habitat quoted in the conservation objectives document for the Lower River Shannon SAC) does not constitute a significant decline. This assessment is made on the basis that the habitat loss and changes associated with the Proposed Project would not reduce the number of available breeding or resting places, would not significantly affect prey availability or abundance and therefore, would not affect the local otter population's ability to maintain itself in the long or short-term. Bankside and riparian habitat loss and disturbance associated with the construction of the Proposed Project would not affect the conservation objective attributes and targets supporting the conservation condition of otter in Lower River Shannon SAC.

875. Infrastructure associated with the RWI&PS has the potential to cause otter habitat fragmentation and a barrier to otter movement along the shore of Parteen Basin during the Construction Phase. Construction of the RWI&PS would likely be completed within a 26-month period from site clearance to demobilisation, therefore any barrier effect created would not result in any significant long-term effects on the local otter population. However, permanent security fencing would be erected around the perimeter of the RWI&PS infrastructure on the bank of Parteen Basin which would result in permanent habitat fragmentation. In the absence of appropriate mitigation this may present a barrier effect to otter within the Lower River Shannon catchment which may affect the conservation objectives supporting the conservation condition of otter in the Lower River Shannon SAC.

7.1.3.1.2 Habitat Degradation as a Result of Excavation and Tunnelling

876. There is one specific location associated with the proposed RWI&PS where construction would involve excavation of approximately 15m within the Lower River Shannon SAC (see Figure 3.2 and Section 3.3.1 for location). As mentioned, the design of the RWI&PS requires the Inlet Chambers to be constructed on the banks of Parteen Basin. In order to create sufficient working area to construct the Intake Chamber and screening area and minimise the extent of excavation, secant piles would be constructed along the shoreline of Parteen Basin. A temporary piling platform would be constructed in Parteen Basin to accommodate the placing of the secant piles along the existing shoreline in constructing the Intake Chamber. This platform would be removed once the substructure has been constructed. Once the Intake Chamber and Pumping Station substructure is completed, the Parteen Basin bed would be reprofiled in the area immediately outside the Intake Chamber. Dredging equipment would be used for the reprofiling over an area of approximately 70m by 25m. The construction of the Intake Chamber would likely be from land, as described above, but it is also possible that this work would be facilitated from moored pontoons on Parteen Basin using working barge(s) to remove excavated material.

877. Dewatering of all excavations would be required to ensure dry working conditions. The appointed Contractor would be required to maintain pumps in any deep excavations, and these would pump water that enters the excavation into two lined Dewatering Settlement Basins operating in sequence. The retention time of water within the Dewatering Settlement Basins would be in excess of 24 hours, allowing particles to settle, in accordance with the TII Drainage Design for National Road Schemes - Sustainable Drainage Options (NRA 2014a) which recommends a 24-hour retention time in sizing sedimentation ponds for control of pollution. This capture of fine material would be further enhanced by filtering the water through fine mesh textile fabric before pumping the settled water back to Parteen Basin. The second of the Dewatering Settlement Basins would drain through Oil Interceptors to a temporary pumping station from where the settled water would be pumped back to Parteen Basin above the flood level of 31.30mAOD (34.0m Poolbeg). As mentioned, the capture of fine material and filtering of water will ensure that all settled water pumped back to Parteen Basin would be within the prescribed water quality limits (i.e. ≤25mg/L total suspended solids in accordance with the Quality of Salmonid Waters Regulations (1988)).

878. The use of secant piles to construct the Intake Chamber would minimise the potential effects associated with excavation in Parteen Basin, however, in the absence of control or mitigation measures, there is still potential for negative effects on the water quality of Parteen Basin downstream of the Proposed Project from the barge or pontoon (oil, chemicals and wastewater) and from the installation works (mobilisation of sediments) leading to potential habitat degradation. The mobilisation of sediments during the construction and removal of the secant piles and temporary piling platform would be temporary in nature. Mitigation measures are detailed in Section 7.1.4.2. Effects on water quality as a result of oil, chemicals and wastewater from the barge or pontoon are considered to be unlikely and imperceptible and are therefore not likely to cause habitat degradation; however, mitigation measures are outlined in Section 7.1.4.3.

879. A precautionary approach is being taken in assuming a level of risk of water quality impacts and associated habitat degradation. Construction mitigation would be required to mitigate potential damage through various avoidance, reduction, mitigation and monitoring measures designed to prevent any pollutants or high levels of silt entering Parteen Basin and the River Shannon in order to ensure protection of the qualifying interest habitats and species of the Lower River Shannon SAC (Section 7.1.4).

880. With regards to the power supply to the RWI&PS and power for the WTP, the works would involve crossings of the Kilmastulla River (WCX001 and WCX077). For the power to the WTP, a trenchless crossing using horizontal directional drilling is proposed at WCX001. This crossing would be approximately 14m in length. It should be noted, while the boundary of the Proposed Project overlaps with the boundary of the Lower River Shannon SAC at this location, no works would take place within the SAC. For the power supply to the RWI&PS, the 20 kV ducting would also cross the Kilmastulla River (WCX077; which is within the boundary of the Lower River Shannon SAC at this location; Figure 3.2), again using horizontal directional drilling methods. This trenchless crossing of the Kilmastulla River would be approximately 20m in length. The level of the ducting would be 1.0m below the invert level of the river at the crossing point. The potential risks to water quality are discussed further below in the hydrological impacts section.

7.1.3.1.3 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

881. There is the potential for hydrological impacts and/or water quality to be affected during testing and commissioning and the Construction Phase of the Proposed Project as there is potential for accidental spillages of pollutants which could affect water quality in the receiving watercourses/water bodies and mitigation measures are required.

882. Hydrostatic pressure testing would be carried out on the Treated Water Pipelines. It is proposed to abstract water from eight water bodies along the route and use the abstracted 'test water' to pressure test the pipeline (Section 5.1.2.2). This water would then be discharged through the use of washouts to land or to water bodies, or tankered away where required. In addition, there are a total of 51 Line Valves along the pipeline route. Two of these are located on the RWRMs and the other 49 are located along the Treated Water Pipeline. The two Line Valves on the RWRMs would not have washouts. Twenty of the 49 Line Valves along the Treated Water Pipeline would have washouts. Washouts at Line Valves would only be used to discharge the sweetening flows during final filling in the Commissioning Phase and the washout design flow would vary between 1l/s and 4l/s. The water used to test the pipeline would be released via one of these 20 Line Valve Washouts. These are detailed in Annex A (Water Body Crossings and Washout Valves – Detailed Assessment) of EIAR Appendix A9.2 (Pipeline Assessment). Such activities in the ZoI of the Lower River Shannon SAC or its tributaries may affect water quality in the European site and has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats hydrologically linked to the European site. Mitigation measures are detailed in Section 7.1.4.3.

883. As the Proposed Project crosses the Kilmastulla River and tributaries to the Kilmastulla River which drain to the Lower River Shannon SAC, construction works at these watercourse crossings pose a risk of affecting water quality in the European site through increasing silt-sediment loading, accidental spillage of cement-based products, accidental spillage of hydrocarbons or through faecal contamination arising from on-site toilets and washing facilities.

884. Affecting water quality in receiving watercourses and in Lower River Shannon SAC has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats hydrologically linked to the Lower River Shannon.

885. The proposed RWI&PS site is situated in the downstream end of the catchment, downstream of Lough Derg, which limits the ZoI of water quality impacts during the Construction Phase to that portion of the Lower River Shannon SAC downstream of the RWI&PS. Any pollution event that may occur would be expected to be minor in comparison to the dilution factor and assimilation capacity of Parteen Basin and the River Shannon, or to be no more than temporary in nature. Therefore, any pollution event during the Construction Phase would not have any precipitable or far-reaching effects within the catchment.

886. It is unlikely, given the design measures in place, that a pollution event of a magnitude that would affect the conservation objectives of the qualifying interest aquatic species would occur during the Construction Phase. However, a precautionary approach is being taken in assuming a level of risk of water quality impacts and construction mitigation is required to mitigate potential damage through various avoidance, reduction, mitigation and monitoring measures designed to prevent any untreated construction runoff water entering Parteen Basin and the River Shannon (Section 7.1.4).

7.1.3.1.4 Habitat Degradation as a Result of Air Quality Impacts

887. During the Construction Phase, the Proposed Project would generate dust which could affect vegetation within the Lower River Shannon SAC, where the Proposed Project lies within this European site. The effects of air pollution on vegetation and habitats are generally greatest within 50 to 100m of a development but effects can extend up to 200m which is considered the maximum distance or the ZoI for the Proposed Project. General best practice construction methodologies such as watering of the construction site/access roads and road cleaning, and mitigation measures such as dust screens during the Construction Phase, are required to minimise construction-generated dust and to contain it within the Proposed Project. Regardless, where the Proposed Project lies within the Lower River Shannon SAC there are no qualifying interest habitats within the ZoI for air quality impacts. Therefore, there would not be any effects on qualifying interest habitat in the Lower River Shannon SAC.

7.1.3.1.5 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

888. Invasive Non-native species have been recorded in close proximity to the Proposed Project (Section 4.3.7.2) and within the Lower River Shannon SAC (Section 4.3.1.2; namely zebra mussel, butterfly bush, rhododendron, and Japanese knotweed). Therefore, construction works within the Proposed Project have the potential to accidently cause the introduction/spread of INNS to habitat areas within or beyond the Lower River Shannon SAC. Given the presence of zebra mussel in Parteen Basin and butterfly bush, rhododendron and Japanese knotweed upstream of the Lower River Shannon SAC, in the absence of control measures and appropriate mitigation there is potential that these species could be introduced or spread during the Construction Phase and colonise other aquatic habitats within or downstream of the Proposed Project. There is also a risk that routine repair and maintenance works may inadvertently spread INNS without the implementation of the mitigation measures.

889. Spreading INNS during the Construction Phase has the potential to worsen the current situation in the Lower River Shannon SAC and affect the distribution, extent and diversity of habitat areas supporting qualifying interest species of the Lower River Shannon SAC.

7.1.3.1.6 Disturbance/Displacement

890. The Proposed Project is partially located within the boundaries of the Lower River Shannon SAC. Therefore, some level of disturbance or displacement effects may be experienced by fauna, specifically qualifying interest species, within the SAC during the Construction Phase. However, such disturbance or displacement effects would be temporary in nature, intermittent, and localised.

891. As mentioned, as there were no otter breeding or resting places, holts or couches within the construction disturbance ZoI (150m), the Proposed Project would not result in any disturbance or displacement effects in that regard. However, otter presence was recorded along the shore of Parteen Basin and the Kilmastulla River. Therefore, increased human presence and/or noise and vibration associated with the construction of the RWI&PS, has the potential (at least temporarily) to displace commuting or foraging otter.

892. Otter are likely to suffer increased disturbance during the Construction Phase. However, any disturbance due to increased human presence, and noise and vibration associated with the Construction Phase (including the installation of the sheet piles in Parteen Basin) is not predicted to result in any significant disturbance to otter using Parteen Basin and the Kilmastulla River; the species is generally nocturnal in habit and therefore, would not be affected by works during normal daylight working hours. Furthermore, otter are known to tolerate human disturbance under certain circumstances (Reid *et al.* 2013), and also as evidenced by the presence of otter signs around Parteen Basin near Parteen Weir which already experiences human activity and has some existing lighting) and the species would be expected to become habituated to the presence of construction activities. An example of such tolerance to an even greater level of disturbance in comparison to the Proposed Project, is from a study carried out on the response of otters to environmental changes imposed by the construction of a large reservoir in Portugal (Pedroso *et al.* 2014). Otter distribution was monitored over four phases (pre-deforestation/flooding, deforestation, flooding, and post-flooding) from 2000 to 2006 in both the flooded and surrounding areas. Over the course of the construction, the study found that the percentage of the area occupied by otters on the 25km^2 scale did not change significantly. The distribution of otters shifted throughout the region during the flooding phase, and on the 1km^2 scale there was a decrease in otters during the deforestation and flooding phases, with some recovery after completion of the project. The results showed that changes in the availability of the main ecological requirements of otter were similar to the changes in the observed otter distribution, i.e. otter displacement appeared to be dependent on availability of prey rather than attributed to disturbance/displacement associated with the construction activities. Considering the above, and considering the absence of otter holts within the ZoI of Parteen Basin, disturbance/displacement due to increased human presence, noise and vibration associated with

construction works within and in the ZoI of Parteen Basin and the Kilmastulla River, does not pose a risk of resulting in significant long-term disturbance/displacement of otter from this reservoir/lake/river system.

893. As noted in Section 2.5.1.6, underwater noise measurements were sampled in Parteen Basin over two weeks in October 2021 to establish a baseline surrounding the proposed location for the RWI&PS. Underwater noise modelling of impact piling and vibration piling in Parteen Basin was subsequently carried out (EIAR Appendix A8.20: Underwater Noise Modelling). Source levels for each noise source were based on direct measurements of noise sources from Subacoustech's noise measurement library that are expected to be similar or otherwise equivalent (as a worst-case scenario) to those produced during the Construction Phase of the Proposed Project. The results of the underwater noise modelling were analysed using criteria for continuous sounds set out by Popper *et al.* (2014) to assess the likely impacts from secant piling drilling or vibropiling sources on fish in the area. It should be noted; no salmonid spawning habitat was recorded within the study area of RWI&PS site and therefore there is no potential to impact salmonid ova.

894. Since drilling (associated with secant piling) and vibropiling are continuous (i.e. non-impulsive) noise sources, the assessment used the criteria from Popper *et al*. (2014) for shipping and continuous sounds as a proxy. Popper *et al*. (2014) only provides a quantitative criterion for fish with a swim bladder involved in hearing for recoverable injury (170 sound level pressure (Lp) 48 hours) and temporary threshold shift (158Lp 12 hours), as data is insufficient for other impacts, and other fish categories. Therefore, to assess the other fish categories (fish with no swim bladder and fish with a swim bladder not involved in hearing), Popper *et al*. (2014) provides a relative risk associated with various impacts, which describes the risk of an effect on a receptor occurring in either the near-field (tens of meters), intermediate-field (hundreds of meters) or far-field (thousands of meters) from the sound source, as high, moderate or low. Due to the extent of Parteen Basin, the potential risk in the near-field distance (tens of metres) and intermediate field distance (hundreds of metres) is relevant in this assessment, and thus, only the risk associated with these distances has been considered.

895. According to Popper *et al*. (2014) guidance, the modelled noise levels indicate it is unlikely that aquatic species will exceed any of the thresholds for fish with a swim bladder involved in hearing at any range from the secant piling (drilling) activities. Across all species of fish, the relative risk of mortality and potential mortal injury, as well as recoverable injury associated secant piling is low in both the near-field and intermediate field distance. Of all the potential impacts, the impact associated with the highest relative risk for all species of fish is masking (reduction in sound detectability due to the simultaneous presence of another sound), which is deemed as high in the near-field and intermediate field.

896. In relation to vibropiling activities, fauna within 60m may exceed the recoverable injury threshold for fish with a swim bladder involved in hearing. Across all species of fish, the relative risk of mortality and potential mortal injury, as well as recoverable injury associated vibropiling is low in both the near-field and intermediate field distance. Of all the potential impacts, the impact associated with the highest relative risk for all species of fish is masking, which is deemed as high in the near-field and intermediate field.

7.1.3.1.7 Mortality Risk

897. During construction of the proposed RWI&PS there is a risk of construction materials accidentally falling into Parteen Basin and killing/injuring aquatic qualifying interest species of the Lower River Shannon SAC, i.e. otter, sea lamprey, brook lamprey, river lamprey and Atlantic salmon. It is extremely unlikely that any such event would occur in the first place considering construction of the intake would take place within secant piles, or that it would result in any of the above species being killed or injured. Even if such an event were to occur, it is also extremely unlikely to affect more than a small number of individuals. Therefore, it is unlikely to have any effect on the populations of these qualifying interest species.

Nevertheless, mitigation is required to prevent this risk (Section 7.1.4). There is also potential for fish to become enclosed by the silt curtain during the construction and removal of the secant piles. However, mitigation measures would be put in place to avoid this (Section 7.1.4).

898. The introduction of the RWI&PS on the bank of Parteen Basin increases the risk of construction machinery collisions with otter. As well as suitable otter habitat occurring on the banks of Parteen Basin, the Kilmastulla River runs in close proximity to the proposed RWI&PS (approximately 460m away) which could potentially bring otter into close proximity with the Proposed Project. Therefore, during the Construction Phase, mitigation would be required to prevent otter accessing the site (Section 7.1.4).

7.1.3.1.8 Barrier Effect

899. The Lower River Shannon catchment would be crossed by the Proposed Project upstream of the Lower River Shannon SAC. The pipeline at the stream crossings would be installed using mainly open cut techniques (with the exception of: Nenagh_070, Little Brosna_030 (WCX026), Camcor_030 (twice), Silver (Kilcormac)_020 and Clodiagh (Tullamore)_020 (WCX039), which would result in a temporary barrier to aquatic species movement in that catchment. Such a temporary effect would not result in any population level effects, but this is dependent on the affected section of river/stream channel being reinstated to its pre-works condition to maintain the hydrological structure and function and prevent any long-term barrier to fish movement within the catchment. Presenting a barrier to fish species movement could isolate important habitat that supports a critical life-cycle stage of Atlantic salmon or lamprey species (e.g. spawning grounds). This has the potential to affect the conservation objectives supporting the conservation condition of these species in the Lower River Shannon SAC. Salmonid and lamprey potential was recorded at a number of the watercourses upstream of the Lower River Shannon SAC, to be crossed by open cut techniques (Table 5.6). The timings of disturbance to watercourses during the construction of each open cut would be for up to one month (worst-case scenario) therefore the temporary barrier effect created would not result in any long-term effects on the local salmonid or lamprey populations. Potential temporary effects in relation to temporary barriers are considered in Section 7.1.3.3.

900. Signs of otter were also recorded at a number of the watercourses upstream of the Lower River Shannon SAC, to be crossed by open cut techniques (Table 5.6) and signs of otter and/or otter holts were recorded at the five watercourses (six crossings) in the Lower Shannon catchment to be crossed by trenchless excavation (EIAR Appendix A8.14: Watercourse Crossing Data). Although the Proposed Project does not cross any watercourses within the Lower River Shannon SAC, otters using the watercourses upstream of the SAC are likely to form part of that European site's otter population. Construction of each trenchless crossing would likely be completed within four to six weeks (worst-case scenario), therefore the temporary barrier effect created would not result in any long-term effects on the local otter population. Potential temporary effects in relation to temporary barriers are considered in Section 7.1.3.3.

7.1.3.2 Operational Phase

7.1.3.2.1 Hydrological Impacts during Operational Phase

901. The Proposed Project would abstract approximately 2% of the annual mean volume of flow at Parteen Basin, and 2.3% of water currently used for hydropower from Parteen Basin. The natural volumetric range of flow in Parteen Basin, with wet and dry years, is approximately ± 30% about the mean in a 25-year period of record. The proposed abstraction of water is considered to be insignificant over such a wide range of natural variation.

902. The proposed abstraction at Parteen Basin would always be from within the existing storage band or Normal Operating Band on Lough Derg, unless flood conditions take water levels outside the Normal Operating Band Limits (Section 3.5.11 and Section 4.1.1), which would be the case for approximately 5% of the time based on the 52 years analysed in the hydrological model. The proposed abstraction

does not subtract from 'Shannon inflow' from Portumna, or from the upstream or downstream tributaries. It does not diminish water flowing through Lough Derg itself. It also would not diminish the minimum compensation water flow rate at Parteen Weir (10m^3/s). The ESB will facilitate the proposed abstraction of water by the Proposed Project within its current operating practices. As part of an overall agreement with ESB, water will be diverted to the Proposed Project abstraction from the flow that would otherwise have been used for electricity generation on a continuous year-round basis. At a practical level, this will mean that ESB, in keeping the water level within the Normal Operating Band on Lough Derg and within the upper and lower water level on Parteen Basin, will take account of, and respond to, the volume of water abstracted for the Proposed Project, alongside other relevant considerations such as, maintaining statutory compensation flow of 10m^3/s down the old Shannon channel, predicted rainfall, the demand for power and operating practices.

903. When the Ardnacrusha Generating Station ceases generation for long periods during low flow conditions (as occurred between 16 June and 28 August 2018), the proposed abstraction would continue to come from the Lake storage. The compensation flow over Parteen Weir to the Old River Shannon would continue undiminished. During this time, the Proposed Project abstraction would result in a gradual divergence in the water level in Parteen Basin through the drought season (albeit within the upper and lower levels that ESB apply), compared with the water level that would exist without abstraction. However, results from the hydrological model show abstraction in this scenario can still exist within the Normal Operating Band on Lough Derg and within the upper and lower water levels that ESB applies on Parteen Basin.

904. As mentioned in Section 5.2.1.1, ESB normally discharges 10m^3/s at Parteen Weir. The circumstance which causes this to increase, is when there is a rising flood, and when Ardnacrusha is already on full load of near 400m^3/s, and Lough Derg is still rising. In that circumstance, ESB allows more water over Parteen Weir. With the Proposed Project in place, the amount by which it would additionally draw down Lough Derg varies from average to dry years, but it is such that the rising flood hydrograph quickly refills that additional drawdown, and the onset of the conditions that call for more water to be released at Parteen Weir then proceeds as before.

905. In summary:

- The abstraction from storage for the Proposed Project would be accurately verified and measured by flowmeter on the RWRM. It would be recognisable within the context of current operations in two forms:
  - During periods of no power generation, it is the water represented by the anticipated incremental drawdown. The abstracted water is the 'missing water' from the Lake storage (within the Normal Operating Band on Lough Derg) during 'no generation periods'
  - When hydropower generation is happening, and generation duration is adjusted under agreement with ESB, the 'missing water' is that not used in hydropower during the shorter generation period at constant turbine output.
- Throughout the period analysed, the Lake remained within the Normal Operating Band and the statutory compensatory flow over Parteen Weir would have been provided
- The predicted negligible magnitude of effect on the levels of water in Lough Derg and Parteen Basin would result in an imperceptible significance of effect under the examined climate change scenario
- The tidal influence in the Tailrace is expected to moderate any changes in levels due to the duration of operation being slightly reduced
- During normal operating conditions, there would be no effect on the compensatory flows to the Old River Shannon as the proposed abstraction is provided from Lake storage and changes to the hydropower generation duration. During drought conditions, when hydropower generation is ceased, again there would be no changes to the statutory compensation flows to the Old River

Shannon as both the compensation flow and the water supply abstraction would continue to take from the Lake storage.

906. The results from the hydrological and hydrodynamic models demonstrate there would be no significant effects on water levels and the flow regime either upstream or downstream of the Proposed Project, therefore, the proposed abstraction is not anticipated to have any effect on the qualifying interest habitats or species of the Lower River Shannon SAC.

7.1.3.2.2 Introduction or Spread of Invasive Non-Native Species

907. Invasive non-native species have been recorded in close proximity to the Proposed Project (Section 4.3.6.2) and within Lough Derg and the Lower River Shannon SAC (Section 4.3.1.2; namely zebra mussel, Asian clam, and Nuttall's waterweed). Therefore, the proposed abstraction of water from Parteen Basin during the Operational Phase of the Proposed Project has the potential to spread or introduce these species to habitat areas within or beyond the Lower River Shannon SAC. In the absence of control measures and appropriate mitigation there is potential that these species could attach to the inside of intake pipes and other pipework or spread via plant fragments in the water and colonise other aquatic habitats within or downstream of the Proposed Project. There is also a risk that routine repair and maintenance works may inadvertently spread INNS.

908. Spreading INNS to the Kilmastulla River (which is a tributary of the Lower River Shannon SAC) during the Operational Phase of the Proposed Project, has the potential to worsen the current situation in the Lower River Shannon SAC and affect the distribution, extent and diversity of habitat areas supporting qualifying interest species of the Lower River Shannon SAC.

7.1.3.2.3 Disturbance/Displacement

909. Otter can be relatively tolerant of human and traffic disturbance under certain circumstances (Reid *et al.* 2013). Any increased level of disturbance associated with the Operational Phase of the Proposed Project is therefore unlikely to result in any perceptible disturbance/displacement of otter from their habitat. There would be some artificial security lighting associated with the RWI&PS, however, this would be minimal and overspill of light would be minimised through directional lighting as per design standards (i.e. aimed directly onto the site and not the wider landscape) so as to leave the areas outside of the footprint of the RWI&PS unilluminated. This would be done through the use of cowls, lighting hoods, or louvres fitted to the rear of luminaires, and/or shields to direct light in a downward and inward fashion to intended areas only. Thus, the Proposed Project would not result in any significant disturbance or displacement of otter during the Operational Phase.

910. Subacoustech Environmental Ltd. undertook underwater noise modelling of operational noise of water pumps in Parteen Basin (EIAR Appendix A8.20: Underwater Noise Modelling). As noted in Section 2.5.1.6, the baseline noise levels in Parteen Basin were sampled during a monitoring survey. Source levels for each noise source were based on direct measurements of noise sources from Subacoustech's noise measurement library that are expected to be similar or otherwise equivalent (as a worst-case scenario) to those produced during the Operational Phase of the Proposed Project. The results of the underwater noise modelling were analysed using criteria for continuous sounds set out by Popper *et al.* (2014) to assess the likely impact on fish in the area. It should be noted; no salmonid spawning habitat was recorded within the study area of RWI&PS site and therefore there is no potential to impact salmonid ova.

911. Noise levels from operational water pumps were predicted as being unlikely to exceed the Popper *et al.* (2014) threshold criteria for continuous noise for all fish species at any range from the RWI&PS when operating at capacity. Across all species of fish, the relative risk of mortality and potential mortal injury, as well as recoverable injury associated with operational pump noise is low in both the near-field and intermediate field distance. Of all the potential impacts, the impact associated with the highest relative

risk for all species of fish is masking (reduction in sound detectability due to the simultaneous presence of another sound), which is deemed as high in the near-field and intermediate field. Based on the measured underwater noise levels at the site, the noise levels from the water pumps (noise source) should reach minimum recorded background levels in Parteen Basin within 550m of the water intake when operating at the maximum abstraction rate (300Mld). Noise level contours are shown in EIAR Appendix A8.20: Underwater Noise Modelling. Based on the Popper *et al.* (2014) threshold criteria for continuous noise, the noise from the water pumps at the RWI&PS is expected to be well below any quantitative impact criteria (injury or temporary threshold shifts), even at very close range. Thus, disturbance/displacement effects on fish species in Parteen Basin during the Operational Phase of the Proposed Project are not predicted to result in any significant adverse effects on the conservation objective attributes and targets supporting the conservation condition of aquatic fauna in the Lower River Shannon SAC.

912. As mentioned, it is proposed to provide an Intake Chamber with three PWWC Intake Screens, to prevent debris and/or fish being taken up into the raw water pumps during the Operational Phase. The screens would be selected so that intake velocities through the screen slots are limited to 0.15m/s, the velocity at which juvenile fish that are known to occur in Parteen Basin can swim away without being trapped against the screen, taking into consideration average water temperatures (Department of Communications, Marine and Natural Resources 2005). This intake velocity is based on scientific research and is considered to be sufficiently low such that fish species and size classes for the fish assemblage in the Lower Shannon catchment would be able to swim away (Taft 1993; Therrien and Bourgeois 2000; Turnpenny and Horsfield 2014; Natural Resources Wales 2020). Thus, disturbance/displacement effects on aquatic fauna in Parteen Basin during the Operational Phase of the Proposed Project are unlikely to occur. The Proposed Project would not result in any significant disturbance or displacement of Atlantic salmon, brook lamprey, river lamprey or sea lamprey species during the Operational Phase and would not affect the conservation objective attributes and targets supporting the conservation condition of these species in the Lower River Shannon SAC.

7.1.3.2.4 Pollution Risk

913. During the Operational Phase, there are potential sources of water quality contamination from the RWI&PS. Rainfall runoff from roads and impermeable areas will be conveyed via a drainage system to a Stormwater Attenuation Tank. An oil interceptor will be located immediately upstream of the attenuation tank. A flow control device on the outlet of the tank will limit discharge stormwater flow leaving the tank to a maximum of 17.35l/s, equivalent to the greenfield runoff from the entire RWI&PS site. Flow from the attenuation tank would be conveyed by a 225mm diameter drain along the RWI&PS access road to a local drainage ditch (WBX002). Drainage from the new access road to the RWI&PS site from the R494 will be captured by a concrete kerb and conveyed to a filter drain on each side of the road. The filter drain would discharge to the existing watercourse (WBX002) which crosses the access track approximately 350m along the access track from the R494. On the RWI&PS site itself, rainwater from the roofs of the Raw Water Pumping Station Building and the two Microfiltration Buildings would be harvested and re-used on site. The site would not be manned and so foul wastewater generated by operational staff on the site is estimated at less than $1m^3/d$ and will be removed by tanker from the Wastewater Holding Tank to a licensed Wastewater Treatment Plant. Further details of this are provided in EIAR Chapter 4 (Proposed Project Description, Section 4.4.6).

914. Provision has been made to allow each of the twin RWRMs to be emptied to a $2,600m^3$ capacity RWRM Scour Tank at the RWI&PS. The RWRM Scour Tank would be located beneath the Microfiltration Buildings and can drain back to the Inlet Chambers, which sit immediately downstream of the PWWC Intake Screens. This system will allow the RWRM to be emptied for repair and maintenance or in emergency without having to discharge any water back to Parteen Basin. The RWI&PS will be a ‘closed loop system’. There will be no discharge of pipeline repair and maintenance water from the RWI&PS

back to Parteen Basin. Furthermore, there will be no wastewater from welfare facilities discharged; it will be contained and removed by tanker at appropriate intervals.

915. It is unlikely that any accidental spillage of hydrocarbons or other pollutants would pass through the system as described above, offering protection to the receiving water bodies. Given the low likelihood of an accidental or other spillage and the protection available through the design of the drainage system, significant effects are not predicted.

916. As mentioned in Section 3.8.4, during the Operational Phase of the Treated Water Pipeline, there would be no routine discharges from the Treated Water Pipeline to the surface water environment. Notwithstanding this, Washout Valves would be located along the pipeline. They would be used very rarely, as planned discharges are an infrequent occurrence and are typically required only for planned repair and maintenance (50 years). Repair and maintenance works may require excavations to repair or replace sections of pipeline. Any residual water in a section of the pipeline that needs to be repaired or replaced would be discharged via the Washout Valves in that section. Such activities in the ZoI of a European site or its tributaries during the Operational Phase may affect water quality in the European site and has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats hydrologically linked to the European site. Mitigation measures are detailed in Section 7.1.4.3.

7.1.3.2.5 Mortality Risk

917. The existing fish passage at Parteen Weir does not accommodate elvers or lamprey species and upstream migrant adult salmon in the Old River Shannon channel are known to struggle to find the pass. In addition, very few downstream migrant fish are likely to find the entrance point of the existing salmon pass. Most swim towards the Headrace and through the turbines which often results in mortality, and some fish cross the spillway gate into the Old River Shannon. The Proposed Project would not, however, alter the existing scenario, therefore, there is no additional risk of mortality to aquatic fauna in Parteen Basin during the Operational Phase as a result of the Proposed Project.

918. During the Operational Phase, there is a risk fish or even otter may become entrapped or entrained in the RWIs. As mentioned in Section 7.1.3.2, the Intake in Parteen Basin would be fitted with PWWC Intake Screens, to prevent debris, fish and/or otter being taken up into the raw water pumps. Intake velocities through the screen slots would be limited to 0.15m/s, the velocity at which juvenile fish that are known to occur in Parteen Basin can swim away without being trapped/held by the screen, taking into consideration average water temperatures (Department of Communications, Marine and Natural Resources 2005). During a study carried out by Black and Perry (2014) on the survival of fish impinged on screens, it was found that while testing 13,000 fish in more than 100 replicates at 0.3m/s, 0.6m/s, and 0.9m/s approach velocities, mortality rates did not exceed 5% for any species and velocity tested. Therefore, it is considered the proposed intake velocity of 0.15m/s is sufficiently low such that the qualifying interest species of the Lower River Shannon SAC would be able to swim away thereby avoiding potential mortality associated with the Intake Chamber during the Operational Phase of the Proposed Project.

7.1.3.3 Summary

919. Table 7.4 presents a summary of the potential impacts on the qualifying interests of the Lower River Shannon SAC as a result of the Proposed Project and how these impacts affect the site's conservation objectives. Those highlighted in blue are the qualifying interests which are present within the ZoI of the Proposed Project that could potentially be impacted.

Table 7.4: Qualifying Interests of Lower River Shannon SAC and Summary of Potential Impacts

Qualifying Interests	Potential Impacts	
	Construction Phase	Operational Phase
Annex I Habitats		
Sandbanks which are slightly covered by sea water all the time [1110]	No potential impact – not present within the ZoI	
Estuaries [1130]	No potential impact – not present within the ZoI	
Mudflats and sandflats not covered by seawater at low tide [1140]	No potential impact – not present within the ZoI	
*Coastal lagoons [1150]	No potential impact – not present within the ZoI	
Large shallow inlets and bays [1160]	No potential impact – not present within the ZoI	
Reefs [1170]	No potential impact – not present within the ZoI	
Perennial vegetation of stony banks [1220]	No potential impact – not present within the ZoI	
Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	No potential impact – not present within the ZoI	
Salicornia and other annuals colonising mud and sand [1310]	No potential impact – not present within the ZoI	
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	No potential impact – not present within the ZoI	
Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	No potential impact – not present within the ZoI	
Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410]	No potential impact – not present within the ZoI	
* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts
Annex II Species		
Margaritifera margaritifera (Freshwater pearl mussel) [1029]	No potential impact – not present within the ZoI	
Petromyzon marinus (Sea lamprey) [1095]	Habitat degradation – water quality impacts Mortality risk Barrier effect	Habitat degradation – water quality impacts
Lampetra planeri (Brook lamprey) [1096]	Habitat degradation – water quality impacts Mortality risk Barrier effect	Habitat degradation – water quality impacts
Lampetra fluviatilis (River lamprey) [1099]	Habitat degradation – water quality impacts Mortality risk Barrier effect	Habitat degradation – water quality impacts
Salmo salar (Atlantic salmon) (only in fresh water) [1106]	Habitat degradation – water quality impacts Mortality risk Barrier effect	Habitat degradation – water quality impacts
Tursiops truncatus (Common bottlenose dolphin) [1349]	No potential impact – not present within the ZoI	
Lutra lutra (Otter) [1355]	Habitat degradation – water quality impacts Habitat loss/fragmentation Disturbance/displacement Mortality risk Barrier effect	Habitat degradation – water quality impacts

920. The specific attributes and targets used to define the conservation objectives of the qualifying interest habitats and species of the Lower River Shannon SAC are presented in Table 7.5, along with the potential impacts associated with the Proposed Project. Those qualifying interests, and the supporting attributes, measures, and targets at risk of being affected by the Proposed Project are highlighted in blue.

Table 7.5: Potential Impacts on the Conservation Objectives of Lower River Shannon SAC

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Sandbanks which are slightly covered by sea water all the time [1110] **To maintain the favourable conservation condition of Sandbanks which are slightly covered by sea water all the time in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Habitat distribution (occurrence)	The distribution of sandbanks is stable, subject to natural processes.	No Given the nature of the Proposed Project, no source-pathway-receptor exists, therefore there is no potential for effects.	No	No potential for effects.
Habitat area (hectares)	The permanent habitat area is stable or increasing, subject to natural processes.			
Community distribution (hectares)	Conserve the following community type in a natural condition: Subtidal sand to mixed sediment with *Nephtys* spp. Community complex.			
Estuaries [1130] **To maintain the favourable conservation condition of Estuaries in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	The permanent habitat area is stable or increasing, subject to natural processes.	No Given the nature of the Proposed Project, no source-pathway-receptor exists, therefore there is no potential for effects.	No	No potential for effects.
Community distribution (hectares)	Conserve the following community types in a natural condition: Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex; Estuarine subtidal muddy sand to mixed sediment with gammarids community complex; Subtidal sand to mixed sediment with *Nucula nucleus* community complex; Subtidal sand to mixed sediment with *Nephtys* spp. community complex; Fucoid-dominated intertidal reef community complex; Faunal turf-dominated subtidal reef community; and Anemone-dominated subtidal reef community.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Mudflats and sandflats not covered by seawater at low tide [1140] **To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	The permanent habitat area is stable or increasing, subject to natural processes.	No Given the nature of the Proposed Project, no source-pathway-receptor exists, therefore there is no potential for effects.	No	No potential for effects.
Community distribution (hectares)	Conserve the following community types in a natural condition: Intertidal sand with *Scolelepis squamata* and *Pontocrates* spp. community; and Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex.			
Coastal lagoons [1150] * **To restore the favourable conservation condition of Coastal lagoons in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes.	No Given the nature of the Proposed Project, no source-pathway-receptor exists, therefore there is no potential for effects.	No	No potential for effects.
Habitat distribution (occurrence)	No decline, subject to natural processes.			
Salinity regime (practical salinity units (psu))	Median annual salinity and temporal variation within natural ranges.			
Hydrological regime (metres)	Annual water level fluctuations and minima within natural ranges.			
Barrier: connectivity between lagoon and sea (permeability)	Appropriate hydrological connections between lagoons and sea, including where necessary, appropriate management.			
Water quality: chlorophyll a (µg/L)	Annual median chlorophyll a within natural ranges and less than 5µg/L.			
Water quality: molybdate reactive phosphorus (MRP) (mg/L)	Annual median MRP within natural ranges and less than 0.1mg/L.			
Water quality: dissolved inorganic nitrogen (DIN) (mg/L)	Annual median DIN within natural ranges and less than 0.15mg/L.			
Depth of macrophyte colonisation (metres)	Macrophyte colonisation to maximum depth of lagoons.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Typical plant species (number and m^2)	Maintain number and extent of listed lagoonal specialists, subject to natural variation.			
Typical animal species (number)	Maintain listed lagoon specialists, subject to natural variation.			
Negative indicator species (number and % cover)	Negative indicator species absent or under control.			
Large shallow inlets and bays [1160] **To maintain the favourable conservation condition of Large shallow inlets and bays in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	The permanent habitat area is stable or increasing, subject to natural processes.	No Given the nature of the Proposed Project, no source-pathway-receptor exists, therefore there is no potential for effects.	No	No potential for effects.
Community distribution (hectares)	Conserve the following community types in a natural condition: Intertidal sand with *Scolelepis squamata* and *Pontocrates* spp. community; Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex; Subtidal sand to mixed sediment with *Nucula nucleus* community complex; Subtidal sand to mixed sediment with *Nephtys* spp. community complex; Fucoid-dominated intertidal reef community complex; Mixed subtidal reef community complex; Faunal turf-dominated subtidal reef community; Anemone dominated subtidal reef community; and *Laminaria* dominated community complex.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Reefs [1170] **To maintain the favourable conservation condition of Reefs in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Habitat distribution (occurrence)	The distribution of reefs is stable, subject to natural processes.	No Given the nature of the Proposed Project, no source-pathway-receptor exists, therefore there is no potential for effects.	No	No potential for effects.
Habitat area (hectares)	The permanent habitat area is stable, subject to natural processes.			
Community distribution (hectares)	Conserve the following community types in a natural condition: Fucoid-dominated intertidal reef community complex; Mixed subtidal reef community complex; Faunal turf-dominated subtidal reef community; Anemone dominated subtidal reef community; and *Laminaria* dominated community complex.			
Perennial vegetation of stony banks [1220] **To maintain the favourable conservation condition of Perennial vegetation of stony banks in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes, including erosion and succession.	No Given the nature of the Proposed Project, no source-pathway-receptor exists, therefore there is no potential for effects.	No	No potential for effects.
Habitat distribution (occurrence)	No decline, or change in habitat distribution, subject to natural processes.			
Physical structure: functionality and sediment supply (presence/ absence of physical barriers)	Maintain the natural circulation of sediment and organic matter, without any physical obstructions.			
Vegetation structure: zonation (occurrence)	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.			
Vegetation composition: typical species and sub-communities (percentage cover at a representative sample of monitoring stops)	Maintain the typical vegetated shingle flora including the range of sub-communities within the different zones.			
Vegetation composition: negative indicator species (percentage cover)	Negative indicator species (including non-natives) to represent less than 5% cover.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetated sea cliffs of the Atlantic and Baltic Coasts [1230] **To maintain the favourable conservation condition of Vegetated sea cliffs in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Habitat length (kilometres)	Area stable or increasing, subject to natural processes, including erosion.	No Given the nature of the Proposed Project, no source-pathway-receptor exists, therefore there is no potential for effects.	No	No potential for effects.
Habitat distribution (occurrence)	No decline, subject to natural processes			
Physical structure: functionality and hydrological regime (occurrence of artificial barriers)	No alteration to natural functioning of geomorphological and hydrological processes due to artificial structures.			
Vegetation structure: zonation (occurrence)	Maintain range of sea cliff habitat zonations including transitional zones, subject to natural processes including erosion and succession.			
Vegetation structure: vegetation height (centimetres)	Maintain structural variation within sward.			
Vegetation composition: typical species and sub-communities (percentage cover at a representative sample of monitoring stops)	Maintain range of subcommunities with typical species listed in the Irish Sea cliff survey (Barron *et al.* 2011).			
Vegetation composition: negative indicator species (percentage)	Negative indicator species (including non-natives) to represent less than 5% cover.			
Vegetation composition: bracken and woody species (percentage)	Cover of bracken (*Pteridium aquilinum*) on grassland and/or heath to be less than 10%. Cover of woody species on grassland and/or heath to be less than 20%.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
***Salicornia* and other annuals colonising mud and sand [1310]** **To maintain the favourable conservation condition of *Salicornia* and other annuals colonising mud and sand in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes, including erosion and succession.	No Given the nature of the Proposed Project, no source-pathway-receptor exists, therefore there is no potential for effects.	No	No potential for effects.
Habitat distribution (occurrence)	No decline, or change in habitat distribution, subject to natural processes.			
Physical structure: sediment supply (presence/ absence of physical barriers)	Maintain natural circulation of sediments and organic matter, without any physical obstructions.			
Physical structure: creeks and pans (occurrence)	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession.			
Physical structure: flooding regime (hectares flooded; frequency)	Maintain natural tidal regime.			
Vegetation structure: zonation (occurrence)	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.			
Vegetation structure: vegetation height (centimetres)	Maintain structural variation within sward.			
Vegetation structure: vegetation cover (percentage cover at a representative sample of monitoring stops)	Maintain more than 90% of area outside creeks vegetated.			
Vegetation composition: typical species and sub-communities (percentage cover)	Maintain the presence of species-poor communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle 2009).			
Vegetation composition: negative indicator species – *Spartina anglica* (hectares)	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] **To restore the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes, including erosion and succession.	No Given the nature of the Proposed Project, no source-pathway-receptor exists, therefore there is no potential for effects.	No	No potential for effects.
Habitat distribution (occurrence)	No decline or change in habitat distribution, subject to natural processes.			
Physical structure: sediment supply (presence/absence of physical barriers)	Maintain natural circulation of sediments and organic matter, without any physical obstructions.			
Physical structure: creeks and pans (occurrence)	Maintain creek and pan structure, subject to natural processes, including erosion and succession.			
Physical structure: flooding regime (hectares flooded; frequency)	Maintain natural tidal regime.			
Vegetation structure: zonation (occurrence)	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.			
Vegetation structure: vegetation height (centimetres)	Maintain structural variation within sward.			
Vegetation structure: vegetation cover (percentage cover at a representative sample of monitoring stops)	Maintain more than 90% of area outside creeks vegetated.			
Vegetation composition: typical species and sub-communities (percentage cover at a representative sample of monitoring stops)	Maintain the presence of species-poor communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle 2009).			
Vegetation composition: negative indicator species – *Spartina anglica* (hectares)	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Mediterranean salt meadows (*Juncetalia maritimi*) [1410] **To restore the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area increasing, subject to natural processes, including erosion and succession.	No Given the nature of the Proposed Project, no source-pathway-receptor exists, therefore there is no potential for effects.	No	No potential for effects.
Habitat distribution (occurrence)	No decline or change in habitat distribution, subject to natural processes.			
Physical structure: sediment supply (presence/absence of physical barriers)	Maintain natural circulation of sediments and organic matter, without any physical obstructions.			
Physical structure: creeks and pans (occurrence)	Maintain creek and pan structure, subject to natural processes, including erosion and succession.			
Physical structure: flooding regime (hectares flooded; frequency)	Maintain natural tidal regime.			
Vegetation structure: zonation (occurrence)	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.			
Vegetation structure: vegetation height (centimetres)	Maintain structural variation within sward.			
Vegetation structure: vegetation cover (percentage cover at a representative sample of monitoring stops)	Maintain more than 90% of area outside creeks vegetated.			
Vegetation composition: typical species and sub-communities (percentage cover)	Maintain the presence of species-poor communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle 2009).			
Vegetation composition: negative indicator species – *Spartina anglica* (hectares)	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Floating Vegetation - Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] **To maintain the favourable conservation condition of Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Habitat area (kilometres)	Area stable or increasing, subject to natural processes.	Yes Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during the Construction Phase or Operational Phase, could potentially have significant negative effects on the water quality in receiving environments. There is also a risk that during the Construction Phase and/or Operational Phase INNS capable of colonising aquatic or wetland habitats could be spread to floating vegetation habitat within the SAC. These impacts could negatively affect the area of floating vegetation habitat in the Lower River Shannon SAC.	Yes Measures to maintain water quality in receiving environments during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts as a result of the Proposed Project on associated floating river vegetation habitats in Lower River Shannon SAC are avoided (refer to Section 7.1.4.3, which outlines water quality control measures). Measures to prevent the spread of INNS during the Construction Phase and/or Operational Phase would be implemented to ensure they are not introduced to/spread within the Lower River Shannon SAC (refer to Section 7.1.4.5 which outlines INNS control measures).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Habitat distribution (occurrence)	No decline, subject to natural processes	Yes The full distributions of this habitat and its three sub-types[20] in the Lower River Shannon SAC are currently unknown (NPWS 2012c). However, none were found to be present in Parteen Basin or within the Proposed Project, though likely to occur on the Old River Shannon downstream of Parteen Weir. The distribution of the 'triangular clubrush' subtype is intertidal so would not be affected by the Proposed Project as it is outside of the ZoI (NPWS 2012c). The 'opposite-leaved pondweed' subtype is typically associated with periodically disturbed watercourses and tidal stretches of rivers (NPWS 2012c). It occurs in the River Abbey near King's Island in County Limerick as well as in some canals and ditches in the Lower Shannon catchment, so again is unlikely to be affected by the Proposed Project. The subtype 'bryophyte-rich streams and rivers' have been recorded in the Bilboa River, which is in a separate WFD sub-catchment to the RWI&PS (Bilboa_SC_010 and Shannon [Lower]_SC_080, respectively) (NPWS 2012c). It has also been recorded in the Mulkear catchment. There is no pathway for effects on either of these locations as they are upstream of the Proposed Project. In addition to these known important bryophyte-rich streams and rivers in the SAC, there are likely to be other stretches with bryophyte-rich sub-types, e.g. mud-dwelling mosses associated with the drawdown zones of lowland rivers and lakes or bryophytes that grow on rocks in and by streams and rivers, where they keep moist from the constant humidity or water splashes (Lockhart *et al*. 2012). Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during the Construction Phase or Operational Phase, could potentially have significant negative effects on the water quality in receiving environments. There is also a risk that during the Construction Phase or Operational Phase, INNS capable of colonising aquatic or wetland habitats could be spread to floating vegetation habitat within the SAC. These impacts could negatively affect the distribution of floating vegetation habitat, in particular the bryophyte-rich sub-types, in the Lower River Shannon SAC.	Yes Measures to maintain water quality in receiving environments during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts as a result of the Proposed Project on associated floating river vegetation habitats in Lower River Shannon SAC are avoided (refer to Section 7.1.4.3, which outlines water quality control measures). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to/spread within the Lower River Shannon SAC (refer to Section 7.1.4.5 which outlines INNS control measures).	No potential for effects, following the implementation of mitigation measures.

[20] 1) Opposite-leaved pondweed, 2) Triangular club-rush, and 3) Bryophyte-rich streams and rivers

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Hydrological regime: river flow (metres per second)	Maintain appropriate hydrological regimes	No The results from the hydrological and water quality models for the Proposed Project (EIAR Appendix A9.5: Baseline) demonstrate there would be no significant effect on water levels and the flow regime either upstream or downstream of the abstraction, therefore, the Proposed Project would not have any adverse effect on the integrity of the Lower River Shannon SAC, having regard to its conservation objectives to maintain appropriate hydrological regimes, tidal regime, or freshwater seepage regimes.	No	No potential for effects.
Hydrological regime: tidal influence (daily water level fluctuations - metres)	Maintain natural tidal regime.			
Hydrological regime: freshwater seepages (metres per second)	Maintain appropriate freshwater seepage regimes.			
Substratum composition: particle size range (millimetres)	The substratum should be dominated by the particle size ranges, appropriate to the habitat sub-type (frequently sands, gravels and cobbles).	No During normal operating conditions, there would be no effect on the compensatory flows to the Old River Shannon as the abstraction is compensated for by changes to the hydropower generation duration. During drought conditions, if hydropower generation had ceased, again there would be no changes to the statutory compensation flows to the Old River Shannon as both the compensation flow and the water supply abstraction would continue to take from storage in Parteen Basin.	No	No potential for effects.
Water quality: nutrients (milligrams per litre)	The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition.	Yes Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during the Construction Phase or Operational Phase, could potentially have significant negative effects on the water quality in receiving environments and result in changes in the concentration of nutrients within the water column.	Yes Measures to maintain water quality in receiving environments during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts as a result of the Proposed Project on associated floating river vegetation habitats in Lower River Shannon SAC are avoided (refer to Section 7.1.4.3, which outlines water quality control measures).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation composition: typical species (occurrence)	Typical species of the relevant habitat sub-type should be present and in good condition.	Yes Three high conservation sub-types are found in the Lower River Shannon SAC, namely: 1. *Groenlandia densa* (opposite-leaved pondweed) 2. *Schoenoplectus triqueter* (triangular club-rush) 3. Bryophyte-rich streams and rivers. The first two sub-types are associated with tidal reaches of rivers and/or periodically disturbed watercourses, while the latter sub-type is found in fast-flowing stretches of unmodified streams and rivers (NPWS, 2012c). Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during the Construction Phase or Operational Phase, could potentially have significant negative effects on the water quality in receiving environments. There is also a risk that during the Construction Phase and/or Operational Phase, INNS capable of colonising aquatic or wetland habitats could be spread to downstream habitats within the SAC. These impacts could negatively affect the vegetation composition of the Lower River Shannon SAC.	Yes Measures to maintain water quality in receiving environments during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts as a result of the Proposed Project on associated floating river vegetation habitats in Lower River Shannon SAC are avoided (refer to Section 7.1.4.3, which outlines water quality control measures). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to/spread within the Lower River Shannon SAC (refer to Section 7.1.4.5 which outlines INNS control measures).	No potential for effects, following the implementation of mitigation measures.
Floodplain connectivity (area)	The area of active floodplain at and upstream of the habitat should be maintained.	No Given the nature of the Proposed Project, no source-pathway-receptor exists, therefore the Proposed Project would not have any adverse effect on the integrity of the Lower River Shannon SAC, having regard to its conservation objectives to maintain floodplain connectivity or riparian habitat at and upstream of the bryophyte-rich sub-type.	No	No potential for effects.
Riparian habitat (area)	The area of riparian woodland at and upstream of the bryophyte-rich sub-type should be maintained.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
***Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410]** **To maintain the favourable conservation condition of *Molinia* meadows on calcareous, peaty or clayey-silt laden soils (*Molinion caeruleae*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes.	No Given the nature of the Proposed Project, no source-pathway-receptor exists, therefore there is no potential for effects.	No	No potential for effects.
Habitat distribution (occurrence)	No decline, subject to natural processes.			
Vegetation structure: broadleaved herb: grass ratio (percentage)	Broadleaved herb component of vegetation between 40 and 90%.			
Vegetation structure: sward height (percentage)	30-70% of sward between 10 and 80cm high.			
Vegetation composition: typical species (number)	At least seven positive indicator species present, including one 'high quality' species.			
Vegetation composition: notable species (number)	No decline, subject to natural processes.			
Vegetation composition: negative indicator species (percentage)	Negative indicator species collectively not more than 20% cover, with cover by an individual species less than 10%. Invasive non-native species, absent or under control.			
Vegetation composition: negative indicator moss species (percentage)	Bog mosses (*Sphagnum* spp.) not more than 10% cover; hair mosses (*Polytrichum* spp.) not more than 25% cover.			
Vegetation Structure: woody species and bracken (*Pteridium aquilinum*) (percentage)	Cover of woody species and bracken not more than 5% cover.			
Physical structure: bare ground (percentage)	Not more than 10% bare ground.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae*) [91E0] * **To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes, at least c.8.5ha for sites surveyed.	Yes There are reports of an increase in this habitat type within the Old River Shannon channel since the construction of the Parteen Weir due to a reduction in seasonal flooding (P. Murphy, personal communication, 10 November 2020). Some areas of woodland which may conform to alluvial woodland, currently not mapped by NPWS, exist within the SAC immediately downstream of the bridge at Ballina/Killaloe (approximately 2km north of the boundary of the Proposed Project). However, no alluvial woodland habitat was recorded within the footprint of the Proposed Project, therefore the habitat area of alluvial woodland would not be directly impacted by the Proposed Project. Furthermore, the Proposed Project would not significantly alter the existing hydrological regime in the Lower River Shannon SAC (i.e. the minimum statutory compensation water flow of $10m^3/s$ directed to the Old River Shannon at Parteen Weir and the Normal Operating Band), therefore the habitat area of alluvial woodland would not be indirectly affected by changes to flow or water levels. Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during the Construction Phase or Operational Phase, could potentially have significant negative effects on the water quality in receiving environments. There is also a risk that during the Construction Phase and/or Operational Phase, INNS capable of colonising aquatic or wetland habitats could be spread to alluvial woodland habitat within the SAC. These impacts could negatively affect the area of alluvial woodland habitat in the Lower River Shannon SAC.	Yes Measures to maintain water quality in receiving environments during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts as a result of the Proposed Project on associated alluvial woodland habitats in Lower River Shannon SAC are avoided (refer to Section 7.1.4.3, which outlines water quality control measures). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to/spread within the Lower River Shannon SAC (refer to Section 7.1.4.5 which outlines INNS control measures).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Habitat distribution (occurrence)	No decline	Yes There are reports of an increase in this habitat type within the Old River Shannon channel since the construction of the Parteen Weir due to a reduction in seasonal flooding. Some areas of woodland which may conform to alluvial woodland, currently not mapped by NPWS, exist within the SAC immediately downstream of the bridge at Ballina/Killaloe (approximately 2km north of the boundary of the Proposed Project). However, no alluvial woodland habitat was recorded within the footprint of the Proposed Project, therefore the habitat distribution of alluvial woodland would not be directly impacted by the Proposed Project. Furthermore, the Proposed Project would not significantly alter the existing hydrological regime in the Lower River Shannon SAC (i.e. the minimum statutory compensation water flow of $10m^3/s$ directed to the Old River Shannon at Parteen Weir and the Normal Operating Band), therefore the habitat distribution of alluvial woodland would not be indirectly affected by changes to flow or water levels. Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during the Construction Phase or the Operational Phase, could potentially have significant negative effects on the water quality in receiving environments. There is also a risk that during the Construction Phase and/or the Operational Phase, INNS capable of colonising aquatic or wetland habitats could be spread to alluvial woodland habitat within the SAC. These impacts could negatively affect the distribution of alluvial woodland habitat in the Lower River Shannon SAC.	Yes Measures to maintain water quality in receiving environments during the Construction and Operational Phases would be implemented to ensure the receiving freshwater environment is protected and impacts as a result of the Proposed Project on associated floating river vegetation habitats in Lower River Shannon SAC are avoided (refer to Section 7.1.4.3, which outlines water quality control measures). Measures to prevent the spread of INNS during the Construction and/or the Operational Phase would be implemented to ensure they are not introduced to/spread within the Lower River Shannon SAC (refer to Section 7.1.4.5 which outlines INNS control measures).	No potential for effects, following the implementation of mitigation measures.
Woodland size (hectares)	Area stable or increasing. Where topographically possible, 'large' woods at least 25ha in size and 'small' woods at least 3ha in size.	No Given the nature of the Proposed Project, and that the pathway for effects is hydrological, there would not be any adverse effect on the integrity of the Lower River Shannon SAC, having regard to its conservation objectives to restore alluvial woodland size, or woodland structure including cover and height, community diversity & extent, or natural regeneration.	No	No potential for effects.
Woodland structure: cover and height (percentage and metres)	Diverse structure with a relatively closed canopy containing mature trees; sub-canopy layer with semi- mature trees and shrubs; and well-developed herb layer.			
Woodland structure: community diversity & extent (hectares)	Maintain diversity and extent of community types.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Woodland structure: natural regeneration (seedling: sapling: pole ratio)	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy.			
Hydrological regime: flooding depth/height of water table (metres)	Appropriate hydrological regime necessary for maintenance of alluvial vegetation.	No The Proposed Project would not significantly alter the existing hydrological regime in the Lower River Shannon SAC (i.e. the minimum statutory compensation water flow of 10m^3/s directed to the Old River Shannon at Parteen Weir and the Normal Operating Band). Therefore, the Proposed Project would not have any adverse effects on the integrity of the Lower River Shannon SAC, having regard to its conservation objectives to restore an appropriate hydrological regime: flooding depth/height of water table.	No	No potential for effects.
Woodland structure: dead wood (m³ per hectare; number per hectare)	At least 30m³/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems > 40cm diameter (> than 20cm diameter in the case of alder).	No Given the nature of the Proposed Project, and that the pathway for effects is hydrological, there would not be any adverse effect on the integrity of the Lower River Shannon SAC, having regard to its conservation objectives to restore alluvial woodland structure, including dead wood, veteran trees, or indicators of local distinctiveness.	No	No potential for effects.
Woodland structure: veteran trees (number per hectare)	No decline			
Woodland structure: indicators of local distinctiveness (occurrence)	No decline			
Vegetation composition: native tree cover (percentage)	No decline. Native tree cover not less than 95%.	No Given the nature of the Proposed Project, and that the pathway for effects is hydrological, there would not be any adverse effect on the integrity of the Lower River Shannon SAC, having regard to its conservation objectives to restore vegetation composition, including native tree cover, typical species, or negative indicator species.	No	No potential for effects.
Vegetation composition: typical species (occurrence)	A variety of typical native species present, depending on woodland type, including alder (*Alnus glutinosa*), willows (*Salix spp.*) and, locally, oak (*Quercus robur*) & ash (*Fraxinus excelsior*).			
Vegetation composition: negative indicator species (occurrence)	Negative indicator species, particularly INNS, absent or under control.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Freshwater pearl mussel *Margaritifera margaritifera* [1029] **To restore the favourable conservation condition of freshwater pearl mussel in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Distribution (kilometres)	Applies to the Cloon River, County Clare only where there is the desire to maintain distribution at 7km.	No Given the nature of the Proposed Project, no source-pathway-receptor exists, therefore there is no potential for effects.	No	No potential for effects.
Population size (number of adult mussels)	Restore to 10,000 adult mussels.			
Population structure: recruitment (percentage per size class)	Restore to least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length. (Note: mussels of no more than 65mm are considered young mussels and may be found buried in the substratum and/or beneath adult mussels. Mussels of no more than 30mm are juvenile mussels and are always buried in the substratum.			
Population structure: adult mortality (percentage)	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution.			
Habitat extent (kilometres)	Restore suitable habitat in more than 3.3km and any additional stretches necessary for salmonid spawning.			
Water quality: macroinvertebrate and phytobenthos (diatoms) (Ecological quality ratio (EQR))	Restore water quality – macroinvertebrates: EQR greater than 0.90; phytobenthos: EQR greater than 0.93.			
Substratum quality: filamentous algae (macroalgae), macrophytes (rooted higher plants) (percentage)	Restore substratum quality- filamentous algae: absent or trace (<5%).			
Substratum quality: sediment (occurrence)	Restore substratum quality - stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Substratum quality: oxygen availability (redox potential)	Restore to no more than 20% decline from water column to 5cm depth in substrate.			
Hydrological regime: flow variability (metres per second)	Restore appropriate hydrological regimes.			
Host fish (number)	Maintain sufficient juvenile salmonids to host glochidial larvae			
Sea lamprey *Petromyzon marinus* [1095] **To restore the favourable conservation condition of sea lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Distribution: extent of anadromy (% of river accessible)	Greater than 75% of main stem length of rivers accessible from estuary.	Yes A land-locked population of sea lamprey has been recorded in Lough Derg; however, no sea lamprey were caught during the 2016 IFI fish stock surveys of Lough Derg and Parteen Basin. No ammocoetes were recorded during the 2017 or 2019 aquatic survey of the RWI&PS site. Spawning has been recorded in the vicinity of Plassey on the Old River Shannon and is likely to occur at suitable habitats upstream as far as Parteen Weir and also on the River Mulkear. Currently upstream migration of sea lamprey is impeded by Parteen Weir and the Ardnacrusha Dam. The Proposed Project would not alter the existing scenario and there would be no additional barrier effects within the Lower River Shannon SAC as a result of the Proposed Project. However, the Proposed Project could potentially pose a temporary physical barrier to sea lamprey movement at open cut stream crossings upstream of the Lower River Shannon SAC during the Construction Phase.	Yes To avoid the crossings upstream of the Lower River Shannon SAC presenting a barrier to sea lamprey, in-stream works would not be carried out during the period March to May for watercourses with lamprey potential (Table 5.6).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Population structure of juveniles (number of age/size groups)	At least three age/size groups present.	Yes There are currently no available data on population structure of juvenile sea lamprey within the Lower River Shannon SAC. No sea lamprey were caught during the 2016 IFI fish stock surveys of Lough Derg and Parteen Basin and no ammocoetes were recorded during the 2017 or 2019 aquatic survey of the RWI&PS site. Spawning has been recorded in the vicinity of Plassey, County Limerick on the Old River Shannon and is likely to occur at suitable habitats upstream as far as Parteen Weir and also on the River Mulkear. Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during the Construction Phase or the Operational Phase, could potentially have significant negative effects on the water quality in receiving environments. This impact could negatively affect the population structure of juvenile sea lamprey in the Lower River Shannon SAC.	Yes Measures to maintain water quality in receiving environments during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts on aquatic habitats in the Lower River Shannon SAC are avoided (refer to Section 7.1.4.3, which outlines water quality control measures).	No potential for effects, following the implementation of mitigation measures.
Juvenile density in fine sediment (juveniles/m²)	Juvenile density at least 1/m².	Yes There are currently no available data on sea lamprey juvenile density in fine sediments within the Lower River Shannon SAC. No sea lamprey were caught during the 2016 IFI fish stock surveys of Lough Derg and Parteen Basin and no ammocoetes were recorded during the 2017 or 2019 aquatic survey of the RWI&PS site. Spawning has been recorded in the vicinity of Plassey, County Limerick on the Old River Shannon and is likely to occur at suitable habitats upstream as far as Parteen Weir and also on the River Mulkear. Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during the Construction Phase or the Operational Phase, could have significant negative effects on the quality, extent and availability of any juvenile lamprey habitat present downstream of the Proposed Project and affect the density of juvenile lamprey present.	Yes Measures to maintain water quality in receiving environments during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts on aquatic habitats in the Lower River Shannon SAC are avoided (refer to Section 7.1.4.3, which outlines water quality control measures).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Extent and distribution of spawning habitat (m² and occurrence)	No decline in extent and distribution of spawning beds.	Yes No suitable lamprey spawning habitat or lamprey ammocoetes were recorded within the study area of the RWI&PS during the 2017 or 2019 aquatic survey. Currently within the Lower River Shannon SAC, spawning appears to be confined to the Old River Shannon downstream of Parteen Weir. There are no available data from the Ardcloony River which may provide suitable spawning habitat for the land-locked population of sea lamprey recorded from Lough Derg. Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during the Construction Phase or the Operational Phase, could have significant negative impacts on lamprey spawning habitat downstream through silt smothering sand/gravel beds. Such impacts could affect the extent and distribution of spawning grounds.	Yes Measures to maintain water quality in receiving environments during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts on aquatic habitats in the Lower River Shannon SAC are avoided (refer to Section 7.1.4.3, which outlines water quality control measures).	No potential for effects, following the implementation of mitigation measures.
Availability of juvenile habitat (number of positive sites in third order channels (and greater), downstream of spawning areas)	More than 50% of sample sites positive.	Yes No ammocoetes were recorded in 2017 or 2019 during core sampling at the RWI&PS site. The Proposed Project would not significantly alter the existing hydrological regime in the Lower River Shannon SAC (i.e. the minimum statutory compensation water flow of $10m^3/s$ directed to the Old River Shannon at Parteen Weir and the Normal Operating Band). Therefore, should juvenile lamprey habitat (silt beds) occur elsewhere in the Lower River Shannon SAC, it would not be indirectly affected by changes to flow or water levels as a result of the Proposed Project. Furthermore, juvenile lamprey are mobile and are capable of adapting to lowering water levels by relocating to deeper water. Downstream of Parteen Weir the extent of juvenile lamprey habitat may have increased due to the reduction in spate flows on Old River Shannon as a result of Parteen Weir. The Proposed Project would not alter the current scenario. Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during the Construction Phase or the Operational Phase, could have significant negative effects on the quality, extent and availability of any juvenile lamprey habitat present downstream of the Proposed Project.	Yes Measures to maintain water quality in receiving environments during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts on aquatic habitats in the Lower River Shannon SAC are avoided (refer to Section 7.1.4.3, which outlines water quality control measures).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Brook lamprey *Lampetra planeri* [1096] **To maintain the favourable conservation condition of brook lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Distribution (% of river accessible)	Access to all watercourses down to first order streams.	Yes Brook lamprey are associated with small streams (their preferred habitat type) and are less likely to occur within Parteen Basin, the main channel of the Old River Shannon, or within the stretch of river downstream of Ballina/Killaloe (i.e. lake/larger river habitats). Their distribution is not currently documented within the Lower River Shannon SAC; however, they are more likely to occur in the smaller watercourses feeding within the sub-catchments of the Feale and Mulkear which feed into the Shannon Estuary downstream of Limerick. The Proposed Project could potentially pose a temporary physical barrier to brook lamprey at open cut stream crossings upstream of the Lower River Shannon SAC.	Yes To avoid the crossings upstream of the Lower River Shannon SAC presenting a barrier to brook lamprey, in-stream works would not be carried out during the period March to May for watercourses with lamprey potential (Table 5.6).	No potential for effects, following the implementation of mitigation measures.
Population structure of juveniles (number of age/size groups)	At least three age/size groups of brook lamprey present.	Yes The Proposed Project would not have any adverse effect on the population structure of juveniles, juvenile density in fine sediments, or extent and distribution of spawning habitat for this species within the Lower River Shannon SAC, in view of their conservation objectives. However, the Proposed Project could pose a physical barrier to brook lamprey movement at open cut stream crossings upstream of the Lower River Shannon SAC during the Construction Phase.	Yes To avoid the crossings upstream of the Lower River Shannon SAC presenting a barrier to brook lamprey, in-stream works would not be carried out during the period March to May for watercourses with lamprey potential (Table 5.6).	No potential for effects, following the implementation of mitigation measures.
Juvenile density in fine sediment (juveniles/m²)	Mean catchment juvenile density of brook lamprey at least 2/m².			
Extent and distribution of spawning habitat (m² and occurrence)	No decline in extent and distribution of spawning beds.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Availability of juvenile habitat (number of positive sites in second order channels (and greater), downstream of spawning areas)	More than 50% of sample sites positive.	Yes No ammocoetes were recorded in 2017 or 2019 during core sampling at the RWI&PS site. The Proposed Project would not significantly alter the existing hydrological regime in the Lower River Shannon SAC (i.e. the minimum statutory compensation water flow of 10m^3/s directed to the Old River Shannon at Parteen Weir and the Normal Operating Band). Therefore, should juvenile lamprey habitat (silt beds) occur elsewhere in the Lower River Shannon SAC, it would not be indirectly affected by changes to flow or water levels as a result of the Proposed Project. Furthermore, juvenile lamprey are mobile and are capable of adapting to lowering water levels by relocating to deeper water. Downstream of Parteen Weir the extent of juvenile lamprey habitat may have increased due to the reduction in spate flows on Old River Shannon as a result of Parteen Weir. The Proposed Project would not alter the current scenario. Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during the Construction Phase or the Operational Phase, could have significant negative effects on the quality, extent and availability of any juvenile lamprey habitat present downstream of the Proposed Project.	Yes Measures to maintain water quality in receiving environments during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts on aquatic habitats in the Lower River Shannon SAC are avoided (refer to Section 7.1.4.3, which outlines water quality control measures).	No potential for effects, following the implementation of mitigation measures.
River lamprey *Lampetra fluviatilis* [1099] **To maintain the favourable conservation condition of river lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Distribution (% of river accessible)	Access to all watercourses down to first order streams.	Yes No river lamprey were caught during the 2016 IFI fish stock surveys of Lough Derg and Parteen Basin and no ammocoetes were recorded during the 2017 or 2019 aquatic survey of the RWI&PS site. Spawning has been recorded in the vicinity of Plassey, County Limerick on the Old River Shannon and is likely to occur at suitable habitats upstream as far as Parteen Weir and also on the River Mulkear. There are no data to suggest that this species occurs upstream of Parteen Weir or the Ardnacrusha Dam. Currently upstream migration of river lamprey is impeded by Parteen Weir and the Ardnacrusha Dam. The Proposed Project would not alter the existing scenario and there would be no additional barrier effects within the Lower River Shannon SAC as a result of the Proposed Project. However, the Proposed Project could potentially pose a temporary physical barrier to river lamprey movement at open cut stream crossings upstream of the Lower River Shannon SAC during the Construction Phase.	Yes To avoid the crossings upstream of the Lower River Shannon SAC presenting a barrier to river lamprey, in-stream works would not be carried out during the period March to May for watercourses with lamprey potential (Table 5.6).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Population structure of juveniles (number of age/size groups)	At least three age/size groups of river lamprey present.	Yes Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during the Construction Phase or the Operational Phase, could potentially have significant negative effects on the water quality in receiving environments. This impact could negatively affect the population structure of juvenile river lamprey in the Lower River Shannon SAC.	Yes Measures to maintain water quality in receiving environments during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts on aquatic habitats in the Lower River Shannon SAC are avoided (refer to Section 7.1.4.3, which outlines water quality control measures).	No potential for effects, following the implementation of mitigation measures.
Juvenile density in fine sediment (juveniles/m²)	Mean catchment juvenile density of river lamprey at least 2/m².	Yes Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during the Construction Phase or the Operational Phase, could have significant negative effects on the quality, extent and availability of any juvenile lamprey habitat present downstream of the Proposed Project and affect the density of juvenile lamprey present.	Yes Measures to maintain water quality in receiving environments during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts on aquatic habitats in the Lower River Shannon SAC are avoided (refer to Section 7.1.4.3, which outlines water quality control measures).	No potential for effects, following the implementation of mitigation measures.
Extent and distribution of spawning habitat (m² and occurrence)	No decline in extent and distribution of spawning beds.	Yes No suitable lamprey spawning habitat or lamprey ammocoetes were recorded within the study area of the RWI&PS during the 2017 or 2019 aquatic survey. Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during the Construction Phase or the Operational Phase, could have significant negative impacts on lamprey spawning habitat downstream through silt smothering sand/gravel beds. Such impacts could affect the extent and distribution of spawning grounds.	Yes Measures to maintain water quality in receiving environments during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts on aquatic habitats in the Lower River Shannon SAC are avoided (refer to Section 7.1.4.3, which outlines water quality control measures).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Availability of juvenile habitat (number of positive sites in second order channels (and greater), downstream of spawning areas)	More than 50% of sample sites positive.	Yes No ammocoetes were recorded in 2017 or 2019 during core sampling at the RWI&PS site. The Proposed Project would not significantly alter the existing hydrological regime in the Lower River Shannon SAC (i.e. the minimum statutory compensation water flow of $10m^3/s$ directed to the Old River Shannon at Parteen Weir and the Normal Operating Band). Therefore, should juvenile lamprey habitat (silt beds) occur elsewhere in the Lower River Shannon SAC, it would not be indirectly affected by changes to flow or water levels as a result of the Proposed Project. Furthermore, juvenile lamprey are mobile and are capable of adapting to lowering water levels by relocating to deeper water. Downstream of Parteen Weir the extent of juvenile lamprey habitat may have increased due to the reduction in spate flows on Old River Shannon as a result of Parteen Weir. The Proposed Project would not alter the current scenario. Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during the Construction Phase or the Operational Phase, could have significant negative effects on the quality, extent and availability of any juvenile lamprey habitat present downstream of the Proposed Project.	Yes Measures to maintain water quality in receiving environments during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts on aquatic habitats in the Lower River Shannon SAC are avoided (refer to Section 7.1.4.3, which outlines water quality control measures).	No potential for effects, following the implementation of mitigation measures.
Atlantic Salmon *Salmo salar* [1106] **To restore the favourable conservation condition of salmon in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Distribution: extent of anadromy (% of river accessible)	100% of river channels down to second order accessible from estuary.	Yes Currently upstream and downstream migration of Atlantic salmon is impeded by Parteen Weir and the Ardnacrusha Dam. The Proposed Project would not alter the existing scenario and there would be no additional barrier effects within the Lower River Shannon SAC as a result of the Proposed Project. However, the Proposed Project could pose a temporary physical barrier to Atlantic salmon movement at open cut stream crossings upstream of the Lower River Shannon SAC during the Construction Phase.	Yes To avoid the crossings upstream of the Lower River Shannon SAC presenting a barrier to Atlantic salmon, in-stream works will not be carried out in watercourses frequented by salmon during the annual close season. The duration of the season varies regionally, and some watercourses have late spawning salmonids. Construction works within/adjacent to watercourses will be in accordance with IFI guidelines (IFI 2016) or as otherwise agreed with IFI during the construction stage.	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Adult spawning fish (number)	Conservation Limit (CL) for each system consistently exceeded.	Yes The conservation limit for the River Shannon is 49,638 salmon per year; however, the average upstream salmon count passing through Parteen Weir and Ardnacrusha Dam each year are known to be considerably less since the construction of the barrier to the present date. The Proposed Project would not alter the existing scenario and there would be no additional barrier effects within the Lower River Shannon SAC as a result of the Proposed Project. However, the Proposed Project could pose a temporary physical barrier to Atlantic salmon movement at open cut stream crossings upstream of the Lower River Shannon SAC during the Construction Phase.	Yes To avoid the crossings upstream of the Lower River Shannon SAC presenting a barrier to Atlantic salmon, in-stream works will not be carried out in watercourses frequented by salmon during the annual close season. The duration of the season varies regionally, and some watercourses have late spawning salmonids. Construction works within/adjacent to watercourses will be in accordance with IFI guidelines (IFI 2016) or as otherwise agreed with IFI during the construction stage.	No potential for effects, following the implementation of mitigation measures.
Salmon fry abundance (number of fry/ five minutes electrofishing)	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling.	No No suitable spawning habitat for salmon was found during the aquatic ecological survey at the RWI&PS site. The nearest suitable spawning habitat to Parteen Basin for salmon is approximately 5km upstream of Killaloe in the Annacarriga River. Given the nature of the Proposed Project, no source-pathway-receptor exists, therefore the Proposed Project would not have any adverse effect on the integrity of the Lower River Shannon SAC, having regard to its conservation objectives to restore salmon fry abundance.	No	No potential for effects.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Out-migrating smolt abundance (number)	No significant decline.	No Currently there is a 'Borland-McDonald' fish lock at Ardnacrusha station and a 'pool-traverse fish pass' at Parteen regulating weir. These both accommodate the upstream and downstream movement of fish. Fish migration may be hindered or delayed due to the existence of hydro stations and their associated fish passes because the species of fish monitored and structural design of the fishways have strong implications for both attraction and passage performance (e.g. Noonan *et al.* 2011, Brunt *et al.* 2012). The Proposed Project would not change the generator discharge rate at the Ardnacrusha Generating Station, however, the duration of discharges would be reduced by approximately 2% on average. This would result in lower volumes of flow through the Ardnacrusha Generating Station through an unchanged generator flow rate operating for a shorter period of time, with marginally longer periods of no flow through Ardnacrusha. Smolts migrating downstream would likely marginally benefit from this scenario as smolts are attracted to higher flows. During reduced periods of hydropower generation, they would therefore be encouraged to migrate downstream over Parteen Weir, instead of through the turbines at Ardnacrusha. Furthermore, within operating guidelines which seek to increase late spring water levels to the upper limit of the Normal Operating Band, the Proposed Project would not impede the ability to adjust appropriate hydropower flows, with increased flow to the Old River Shannon during periods of smolt migration (April).	No	No potential for effects.
Number and distribution of redds (number and occurrence)	No decline in number and distribution of spawning redds due to anthropogenic causes.	No No suitable spawning habitat for salmon was found during the aquatic ecological survey at the RWI&PS site. The nearest suitable spawning habitat to Parteen Basin for salmon is approximately 5km upstream of Killaloe in the Annacarriga River. Given the nature of the Proposed Project, no source-pathway-receptor exists, therefore the Proposed Project would not have any adverse effect on the integrity of the Lower River Shannon SAC, having regard to its conservation objectives to restore the number and distribution of redds.	No	No potential for effects.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Water quality (EPA Q value)	At least Q4 at all sites sampled by EPA.	Yes Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during the Construction Phase or the Operational Phase, could potentially have significant negative effects on the water quality in receiving environments.	Yes Measures to maintain water quality in receiving environments during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts as a result of the Proposed Project on the Lower River Shannon SAC are avoided (refer to Section 7.1.4.3, which outlines water quality control measures).	No potential for effects, following the implementation of mitigation measures.
Bottlenose dolphin *Tursiops truncatus* [1349] **To maintain the favourable conservation condition of bottlenose dolphin in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Access to suitable habitat (number of artificial barriers)	Species range within the site should not be restricted by artificial barriers to site use.	No Given the nature of the Proposed Project, no source-pathway-receptor exists, therefore there is no potential for effects.	No	No potential for effects.
Habitat use: critical areas (location and hectares)	Critical areas, representing habitat used preferentially by bottlenose dolphin, should be maintained in a natural condition.			
Disturbance (level of impact)	Human activities should occur at levels that do not adversely affect the bottlenose dolphin population at the site.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
European Otter *Lutra lutra* [1355] **To restore the favourable conservation condition of otter in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Distribution (percentage positive survey sites)	No significant decline.	Yes No otter holts or couches were recorded in the study area of the RWI&PS; however, activity and foraging are likely to occur in the area. The construction of the RWI&PS would result in the permanent loss of approximately 960m^2 of otter habitat on the eastern shore of Parteen Basin, which is less than 0.01% of the total extent of terrestrial habitat available in the Lower River Shannon SAC, which is not considered to constitute a significant decline and would not impact otter distribution. This assessment is made on the basis that the habitat loss and changes associated with the Proposed Project would not reduce the number of available breeding or resting places, would not affect prey availability or abundance and therefore, would not affect the local otter population's ability to maintain itself in the long or short term. The construction of the RWI&PS has the potential to cause otter habitat fragmentation and a barrier to otter movement along the shore of Parteen Basin during the Construction and Operational Phases. Construction of the RWI&PS would likely be completed within a 26-month period from site clearance to demobilisation, therefore any barrier effect created would not result in any significant long-term effects on the local otter population. However, permanent security fencing would be erected around the perimeter of the RWI&PS infrastructure on the bank of Parteen Basin. In the absence of appropriate mitigation this may present a barrier effect to otter within the Lower River Shannon catchment. The construction of the RWI&PS on the bank of Parteen Basin also increases the risk of construction machinery collisions with otter. The Lower River Shannon catchment would be crossed by the Proposed Project upstream of the Lower River Shannon SAC. The pipeline at the stream crossings may result in a temporary barrier to otter in the catchment.	Yes To avoid the RWI&PS causing otter habitat fragmentation and presenting a barrier to otter movement, otter passage facilities would be provided (Section 7.1.4, where that section's content is appropriate). The use of otter-resistant fencing would be used to prevent otter gaining access to the RWI&PS construction site (Section 959 which outlines measures on mammal fencing). Although no otter holts or couch sites are directly impacted by the Proposed Project, there is the potential that new holts/couch sites would be created before construction commences. Therefore, pre-construction surveys would be undertaken to identify any changes in holt/couch locations. If found to be present and potentially impacted by construction works, holts/couches will be protected in the first instance and/or removed, if required, whilst avoiding any direct impacts on otter (Section 7.1.4.1, which outlines measures in relation to pre-construction surveys). For trenchless excavations, no works would be undertaken within the riparian zone (i.e. between the launch and reception shafts and the watercourse itself). This would allow otter to move freely up and down the watercourse along the riparian corridor during the Construction Phase. For open cut excavations, mammal walkways would be constructed in accordance with Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (NRA 2008b).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Extent of terrestrial habitat (hectares)	No significant decline. Area mapped and calculated as 596.8ha above high water mark (HWM); 958.9ha along riverbanks/around ponds.	No The construction of the RWI&PS would result in the permanent loss of approximately 960m^2 of otter habitat on the eastern shore of Parteen Basin, which is less than 0.01% of the total extent of terrestrial habitat available in the Lower River Shannon SAC, which is not considered to constitute a significant decline and would not impact otter distribution. This assessment is made on the basis that the habitat loss and changes associated with the Proposed Project would not reduce the number of available breeding or resting places, would not affect prey availability or abundance and therefore, would not affect the local otter population's ability to maintain itself in the long or short term.	No	No potential for effects.
Extent of marine habitat (hectares)	No significant decline. Area mapped and calculated as 4,461.6ha.	No Given the nature of the Proposed Project, no source-pathway-receptor exists, therefore the Proposed Project would not have any adverse effect on the integrity of the Lower River Shannon SAC, having regard to its conservation objectives to restore the extent of marine habitat or freshwater (river) habitat.	No	No potential for effects.
Extent of freshwater (river) habitat (kilometres)	No significant decline. Length mapped and calculated as 500.1km.			
Extent of freshwater (lake/lagoon) habitat (hectares)	No significant decline. Area mapped and calculated as 125.6ha.	No The construction of the RWI&PS would result in the temporary loss of approximately 0.6ha of otter habitat in Parteen Basin, which is less than 0.45% of the total extent of lake habitat available in the Lower River Shannon SAC, which is not considered to constitute a significant decline and would not impact otter distribution. This assessment is made on the basis that this temporary habitat loss would not reduce the number of available breeding or resting places, would not have a significant effect on prey availability or abundance and therefore, would not affect the local otter population's ability to maintain itself in the long or short term.	No	No potential for effects.
Couching sites and holts (number)	No significant decline.	No No otter holts or couches were recorded in the study area of the RWI&PS, therefore there would be no effect on couches or holt sites as a result of the Proposed Project. Pre-construction survey should be undertaken to ensure no development of couch or holts since the earlier surveys undertaken (latest October 2022).	No	No potential for effects.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Fish biomass available (kilograms)	No significant decline.	Yes Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during the Construction Phase or the Operational Phase, could potentially have significant negative effects on the water quality in receiving environments, which could have indirect effects on fish biomass.	Yes Measures to maintain water quality in receiving environments during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts as a result of the Proposed Project on the Lower River Shannon SAC are avoided (refer to Section 7.1.4.3, which outlines water quality control measures).	No potential for effects, following the implementation of mitigation measures.
Barriers to connectivity (number)	No significant increase.	Yes Currently upstream and downstream movement of otter is partially impeded by Parteen Weir and the Ardnacrusha Dam. The Proposed Project would not alter the existing scenario and there would be no additional barrier effects in the water within the Lower River Shannon SAC as a result of the Proposed Project. The construction of the RWI&PS would locally impede movement along the shore, but due to the nature of the Parteen Basin, this is not likely to present a significant impediment to habitat continuity. The Lower River Shannon catchment would be crossed by the Proposed Project upstream of the Lower River Shannon SAC. The pipeline at the stream crossings may result in a temporary barrier to otter in the catchment.	Yes To avoid the RWI&PS causing otter habitat fragmentation and presenting a barrier to otter movement, otter passage facilities would be provided. (refer to Section 7.1.4.8 which outlines passage facilities proposed for otter). For trenchless excavations, no works would be undertaken within the riparian zone (i.e. between the launch and reception shafts and the watercourse itself). This would allow otter to move freely up and down the watercourse along the riparian corridor during the Construction Phase. For open cut excavations, mammal walkways would be constructed in accordance with Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (NRA 2008b).	No potential for effects, following the implementation of mitigation measures.

7.1.4 Design Requirements and Mitigation Measures

921. This section presents the mitigation measures required in addition to the design measures which are set out in Section 3.5 of this NIS and are summarised again below. The design measures have either avoided or reduced the potential for the Proposed Project to affect the conservation objectives of the Lower River Shannon SAC within its ZoI:

- The design of the Proposed Project does not include any works or permanent structures within any Annex I habitats within the Lower River Shannon SAC
- The bankside design avoids any permanent pipework on the bed of Parteen Basin – the intake of water occurs at the bank of the watercourse, via Intake Chambers positioned below ground level
- The process wastewater will be treated on-site to a standard which permits its return to the head of the main treatment process for treatment to drinking water standards which will in turn avoid discharge of process waters into the Lower River Shannon SAC
- The Scour Tank in the Raw Water Pumping Station is designed to capture the draindown from the RWRMs during repair and maintenance which will avoid discharge to the Lower River Shannon SAC
- The drainage design for the WTP includes rainwater harvesting and attenuation which will minimise surface water discharge to the Kilmastulla River and Lower River Shannon SAC
- As part of an overall agreement with ESB, water will be diverted to the Proposed Project abstraction from the flow that would otherwise have been used for electricity generation on a continuous year-round basis. At a practical level, this will mean that ESB, in keeping the water level within the Normal Operating Band on Lough Derg and within the upper and lower water level on Parteen Basin, will take account of, and respond to, the volume of water abstracted for the Proposed Project, alongside other relevant considerations such as, maintaining statutory compensation flow of 10m^3/s down the old Shannon channel, predicted rainfall, the demand for power and operating practices. ESB will maintain the water levels within the Normal Operating Band on Lough Derg and within the upper and lower water level on Parteen Basin, as it does currently.

922. However, despite these design measures, mitigation measures are also required and will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an EcoW/team of EcoWs that will be appointed by Uisce Éireann or its agents but not the appointed Contractor (although the appointed Contractor may have their own ecologists) to oversee and implement all ecological mitigation, and ensure that the Proposed Project will not affect the conservation objectives of the Lower River Shannon SAC within its ZoI.

923. The potential impacts to the Lower River Shannon SAC associated with the Proposed Project that require mitigation are:

- Habitat Loss/fragmentation: measures to minimise habitat loss in the Lower River Shannon SAC and ensure the Proposed Project does not present a barrier to otter movement within and around Parteen Basin
- Habitat degradation (excavation): measures to minimise disturbance and maintain the integrity of downstream habitats during the construction of the RWI&PS in Parteen Basin
- Habitat degradation (hydrology): measures to protect water quality in Parteen Basin and the receiving environment
- Habitat degradation (air quality): measures to control dust emissions during construction, repair and maintenance of the RWI&PS
- Habitat degradation (INNS): measures to avoid the introduction or spread of INNS within or beyond the Lower River Shannon SAC

- Disturbance/displacement: measures to avoid/reduce the disturbance/displacement effects associated with construction machinery and activities of qualifying interest species using Parteen Basin
- Mortality risk: measures to avoid mortality of qualifying interest species.

924. Integral to this is the Construction Environmental Management Plan (CEMP) which is included in EIAR Appendix A5.1 (CEMP). In addition, a Surface Water Management Plan (SWMP) has been prepared and is included in Annex A of EIAR Appendix A5.1 (CEMP). Relevant details from the SWMP are provided herein, in particular in Section 7.1.4.3.

925. The CEMP summarises the overall environmental management strategy that will be adopted and implemented during the Construction Phase of the Proposed Project. The purpose of the CEMP is to demonstrate how the proposed Construction Phase can be delivered in a logical, sensible and safe sequence with the incorporation of specific environmental control measures relevant to construction works of this nature. Implementation of the CEMP will ensure disruption and nuisance are kept to a minimum. The CEMP has been prepared with regard to industry best practice guidance including:

- Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction and Demolition Projects as published by the EPA (2021)
- Waste Minimisation in Construction Report No. SP133 (CIRIA 1997)
- Guidelines for the Management of Waste from National Road Construction Projects (NRA 2014c)
- Control of Water Pollution from Construction Sites Report No. C532D (CIRIA 2001)
- Control of Water Pollution from Linear Construction Projects Report No. C648D (CIRIA 2006).

926. The CEMP has been prepared in conjunction with the EIAR and NIS, having regard to consultations with a range of specialists and environmental organisations, in particular the NPWS and IFI. The CEMP supports the information already provided in the EIAR and the NIS and must be read in conjunction with the information already provided in the NIS. The details relevant to European sites are already provided in the NIS.

927. The CEMP is of necessity a working document and will be finalised by the appointed Contractor following appointment and prior to commencing works on-site. All of the content provided in the CEMP which accompanies the application will be delivered in full by the appointed Contractor and its finalisation by the Contractor will not affect the robustness and adequacy of the information presented and relied upon in the NIS.

7.1.4.1 Habitat Loss/Fragmentation Mitigation Measures

928. Site clearance including vegetation clearance will be undertaken within the Proposed Project boundary. The clearance of vegetation including the treatment of plant INNS will be done in accordance with the Non-Native Invasive Species Management Plan (included in the CEMP, see EIAR Appendix A5.1). The Non-Native Invasive Species Management Plan will be implemented sufficiently far in advance of the proposed construction works commencing so as to allow time to adequately control all target INNS populations, having regard to the specific timing/seasonal constraints that apply in relation to each individual species. The Non-Native Invasive Species Management Plan will direct the Contractors in implementing the specific mitigation measures required in relation to individual INNS. Within the Lower River Shannon SAC, all areas of the site required for the construction of the RWI&PS will be cleared down to ground level and then excavated below ground for the pipework.

929. The maximum area required to facilitate the construction of the RWI&PS is the area within the footprint; however, the minimum working area necessary to facilitate the construction of the RWI&PS will be used. This area will be clearly delineated and fenced off at the outset of works and maintained for the duration

of the construction programme. Once constructed, the temporary piling platform and secant piles will serve to delineate the maximum working area in Parteen Basin. No works within the boundaries of the Lower River Shannon SAC will be undertaken outside of the fenced-off zone and the temporary piling platform and secant piles.

930. Concrete revetment mats will be placed on the reprofiled bed and used for erosion control in the area immediately outside the Intake Chamber. It will be provided with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native flora and fauna once construction is complete, which would ultimately restore the habitat temporarily lost in that area. As previously noted, given the intake volume and rate, the flow in the area of the concrete revetment mats was calculated to be <0.3m/s, which is a low enough velocity to not cause the clean granular or other native bed material to be washed away, thereby allowing recolonisation to occur.

931. Confirmatory pre-construction otter surveys (resting and breeding places) will be undertaken prior to the commencement of any works in order to identify any changes in otter activity or holt locations from the original baseline surveys and to verify or amend the mitigation proposals accordingly. Pre-construction surveys will be conducted no more than 10-12 months in advance of construction, as per the NRA guidelines (2008b). If any new otter holts are identified during pre-construction surveys and will be directly impacted by the Proposed Project, then exclusion procedures will be undertaken. To ensure the welfare of otters, they must be evacuated from any active holts present prior to any construction works commencing (NRA 2008b). Otters with cubs however will not be evacuated until the otters have vacated the holt themselves naturally. In the case of non-breeding active holts, general disturbance (e.g. vegetation clearance) and chemical deterrents will be used first to encourage the otters to vacate the holts. Once the otters have left the holt, the entrance will then be soft blocked (using vegetation and a light application of soil). In some cases, the installation of one-way gates on the entrances to the holt may be required and a monitoring period of 21 days will be carried out to ensure the otters have left the holt prior to removal. There are no seasonal restrictions with regard to the exclusion of otters from disused, or currently inactive, holts within the land-take of the Proposed Project. Confirming that a holt is inactive would usually require a period of monitoring (five or more days of checking activity at the holt either with sticks or with sand pads to identify footprints). Where holts have been verified as inactive, and to prevent their reoccupation, the entrances will be soft blocked. If the entrances remain undisturbed for five days, the holt will then be destroyed immediately using a mechanical digger, under the supervision of the holder of an NPWS derogation licence. It should be noted, no otter holts within or linked to European sites, were recorded within the ZoI of the Proposed Project, therefore the need for a derogation licence pre-consent has not been identified based on best scientific data. Otter holts recorded that are not linked to European sites and associated derogation licence for same are discussed in EIAR Chapter 8 (Biodiversity). To avoid the RWI&PS causing otter habitat fragmentation and presenting a barrier to otter movement, a 1m wide otter run/ledge will be provided between the site security fence and the edge of the intake structure (EIAR Figure 4.61). Wildlife fencing around the perimeter of the RWI&PS will also be used to ensure that otters use the run/ledge rather than attempting to cross through the site. Mammal passes will be constructed in accordance with the Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (NRA 2008b).

7.1.4.2 Habitat Degradation (Excavation and Tunnelling) Mitigation Measures

932. A detailed construction methodology for the proposed RWI&PS is provided in the EIAR Chapter 5 (Construction & Commissioning) which includes the following mitigation measures to ensure that excavation works in Parteen Basin do not affect the qualifying interests of the Lower River Shannon SAC:

- A temporary piling platform and secant piles will be employed to allow work on the intake structure and below-ground sections of the pumping station to proceed in dry conditions, below the prevailing water level outside the dam in Parteen Basin. The secant piles will be created using a shallow guide wall at ground level around the perimeter of the underground structures, to set out

the position of the secant piles. The primary piles would then be formed by first drilling a series of boreholes into the ground down to the bedrock level at every second pile location and then filling the boreholes with concrete. Once the primary piles are cast an augur would cut and remove the soil between the primary piles. A steel reinforcement cage would be lowered into the secondary borehole and then it would be filled with concrete to form the secondary pile, which intersects with the primary piles to form a continuous structure. This process would be repeated around the perimeter of the structure until the secant pile wall is complete. The area within the pile wall would then be excavated and the Raw Water Pumping Station substructure can be constructed

- Dewatering of all excavations would be required to ensure dry working conditions. Pumps will be maintained in the excavation which will pump water that enters the excavation into two lined Dewatering Settlement Basins. The retention time of water within the Dewatering Settlement Basins would be in excess of 24 hours, allowing particles to settle. This capture of fine material would be further enhanced by filtering the water through fine mesh textile fabric before pumping the settled water back to Parteen Basin. The second of the Dewatering Settlement Basins would drain through Oil Interceptors to a temporary pumping station from where the settled water would be pumped back to Parteen Basin above the flood level of 31.30mAOD (34.0m Poolbeg). The capture of fine material and filtering of water would ensure that all settled water pumped back to Parteen Basin would be within the prescribed water quality limits (i.e. ≤25mg/L total suspended solids in accordance with the Quality of Salmonid Waters Regulations (1988)
- A double row of heavy-duty Type 3 silt curtains would be placed around the construction area to prevent silt from entering the main Parteen Basin body of water. Once the Intake Chamber and Pumping Station substructure is completed, the Parteen Basin bed would be reprofiled in the area immediately outside the Intake Chamber. Dredging equipment would be used for the reprofiling over an area of approximately 70m by 25m. The silt curtains would remain in place until this operation has been completed and silt has settled out. The silt curtains will be designed to be able to withstand the water velocity of a 1 in 100 flood flow (with an allowance for Climate Change). Buoyant along the top edge of the curtain will be provided in order to move with fluctuations in the water level up to a 1:100 flood event (with an allowance for Climate Change). The silt curtains will be secured along the bottom edge of the curtain in order to prevent silt egress underneath. This will be done using a steel ballast chain or equivalent to maintain the curtains vertical position in the water.

933. With regard to the trenchless construction, which would involve tunnelling under major crossings such as watercourses, the following mitigation measures will be implemented to avoid/reduce adverse effects on the integrity of European sites:

- For the power to the WTP, a trenchless crossing using horizontal directional drilling is proposed at WCX001. This crossing would be approximately 14m in length. It should be noted, while the boundary of the Proposed Project overlaps with the boundary of the Lower River Shannon SAC at this location, no works will take place within the SAC
- All materials (chemicals and oil) stored in the compounds at the launch and reception shafts will be in secured bunded containers (of at least 110% capacity of the fuel tank itself or at least 25% of the total volume of the containers, whichever is greatest) on impervious bases
- The layout of the crossing area is designed to avoid impacting on riverbanks and contamination of the river with either dewatering fluid, silty water runoff or bentonite slurry. In particular, the reception and launch pits for the trenchless excavation will be located as per the requirements of the detailed design to be completed by the appointed Contractor, but will be contained within the Proposed Project and will be chosen or engineered such that the fall is away from the water body and beyond the riparian habitat. Soil stockpiles and fuel storage tanks will be a minimum of 10m from the watercourse (CIRIA 2006). Silt fences will be placed downslope of the excavated stockpiles as required
- Dewatering will be undertaken in accordance with CIRIA C750 Groundwater Control – Design and Practice 2nd Edition (CIRIA 2016). Mitigation measures (as detailed in the EIAR Surface Water Management Plan (Appendix A5.1 Annex A)) include:
  - Using techniques such as sheet piles, bored piles or grouting to keep out groundwater

- Diverting water by digging cut-off ditches (for greenfield sites) or placing sandbags or a small earth bund around the edge of the excavation
- Where a discharge to a watercourse or local drainage system is necessary, the water will be treated and controlled in accordance with any conditions imposed by regulatory authorities. Silt will be managed through the use of settlement lagoons, silt buster tanks, or a combination as appropriate
- In accordance with IFI requirements for salmonid waters (and Quality of Salmonid Waters Regulations (1988)), suspended solids in any discharge will not be greater than 25mg/L and flows will be controlled to levels appropriate to the receiving water
- Discharge to watercourse of excavation dewatering will be limited to a maximum of 20% of QMED of the receiving watercourse.

- The appointed Contractor will use environmentally friendly drilling lubrication oils (i.e. biodegradable oils or similar), where possible, for the micro-tunnelling to minimise the impact of drilling on the underlying groundwater and soils at the crossing location
- All bentonite usage will be monitored though materials balance calculations, pressure monitoring in the lines and above-ground visual assessment of the works to ensure that should breakout occur the volume is minimised. A contingency management plan will be prepared by the appointed Contractor. If survey and monitoring procedures indicate that a breakout has occurred, the appointed Contractor will cease pumping, the incident will be responded to immediately with containment, repairs and clean-up of any slurry which has spilled, and processes detailed in their contingency plan will be implemented. Regulatory agencies will immediately be notified regarding a suitable course of action. The risk of breakout is likely to occur when:
  - Shallow – passing through weak and saturated soils with little inherent strength
  - Shallow – passing through heavy granular material where bore stability may be difficult to control
  - Deep – if heavy fractured rock causes bore instability and a pre-existing pathway exists to allow drilling fluid to escape to the environment.

934. The primary means of mitigation is through the use of appropriate drilling mud formulation and management for the conditions. For shallow sections, especially where these are unavoidable at the beginning and end of the bore, the emphasis is on appropriate drilling practices for the overburden. Steel casings can also be installed along the alignment from the surface. For breakouts at depth, the emphasis on environmental mitigation is focused upon containment, control and cleanup. Beyond improving the drilling mud formulation and/or drilling processes, which is often sufficient, the leakage path can be sealed with a special lost-circulation material. These materials are introduced as slugs into the drill pipe and pumped onto the bore to clog the pathway. Containment measures include the installation of interception devices (e.g., silt fence, sediment curtains, collection sumps). In the event of a bentonite break-out, the site will be monitored for chemical and macro-invertebrate communities to ensure no residual impacts. This may include both benthic and water quality measurements. The drilling fluid/bentonite will be non-toxic and naturally biodegradable (i.e. Clear bore Drilling Fluid or similar will be used).

7.1.4.3 Habitat Degradation (Hydrological/Water Quality) Mitigation Measures

935. No refuelling of the barge or the equipment contained on it will be undertaken on the water. All refuelling will take place in port in designated areas (for the barge) and on land for the equipment on the barge. With respect to the barge, oil, bilge water and sewage will be contained within the barge itself and disposed of at appropriately licensed sites. Uses which will be specific to the construction of the temporary piling platform and secant piles include the addition of plant and machinery, such as cranes and piling rigs. These will require fuel and the potential for spillage is as described above. No refuelling of the barge or the equipment contained on it will be undertaken on the water; all refuelling will take place in port in designated areas (for the barge) and on land for the equipment on the barge.

936. While there will be no concrete structures constructed within Parteen Basin, there will be an intake screen chamber constructed in reinforced concrete adjacent to the shoreline. The intake screen chamber will be constructed within the secant piles where concrete works can be constructed in the dry thus preventing risk to the water body and surrounding aquatic ecology.

937. Silt generated from construction works, such as construction and removal of the temporary piling platform in Parteen Basin, will be contained by means of a suitable silt curtain installed in Parteen Basin around the work areas. Silt generated during the Construction Phase will be allowed sufficient settlement time in the water contained within the silt curtain. Silt/sediment accumulation between the silt curtain and sheet pile will be removed by the use of Sedimats™ or pumped into dewatering silt bags.

938. As mentioned in Section 3.6.2, the installation methods for the pipeline will be either via 'open cut' or 'trenchless' techniques; for the most part, the pipeline will be installed via 'open cut'. The following general requirements and control measures will be implemented during the construction of the Proposed Project in or adjacent to all watercourses:

- All construction works in and adjacent to waters will be carried out in accordance with IFI (2016) guidelines or as otherwise agreed with IFI during the construction stage. These construction works will be monitored by an ECoW
- The natural path of water flow of rivers or streams will not be permanently diverted or blocked
- There will be no temporary or permanent dewatering of rivers or streams downstream of construction sites
- Works within and adjacent to watercourses will be suspended during periods of heavy rainfall (i.e. greater than 10mm/hour or greater than 25mm in a 24-hour period)
- Measures (avoiding construction works during adverse weather events, implementing sufficient setback distances, and ensuring the appropriate management of stockpiles) will be taken to prepare construction sites for erosive processes associated with the heavy rainfall to minimise impact on rivers and streams
- In channels which have spawning lamprey populations (refer to Section 4.3 and Table 5.6), in-stream work will be undertaken outside of the lamprey spawning season. River and brook lamprey spawn during the period March to April, while sea lamprey spawn during the period May to August. Lamprey do not spend the same length of time in gravelled substrate as salmonids so timing restrictions in channels with spawning lamprey populations only (and not salmonids) can be reduced to cover the March to May period. Any salmonid spawning gravels and juvenile lamprey habitat will be removed where encountered and reinstated after construction works are completed. Reinstatement work will be monitored by the ECoW. In addition to the reinstatement of spawning gravels, the reintroduction of gravels at watercourse crossings along the Proposed Project as a potential enhancement measure, will be considered in consultation with IFI. Typically, this would be upstream and downstream of scour pools where salmonid spawning habitat would be expected to occur naturally. In straightened channels it may be appropriate to insert paired deflectors to generate scour and pool development with gravel placement at the end of the scour pool (O'Grady 2006). Gravels would be introduced within the Planning Application Boundary (which would typically mean approximately 50m of a watercourse, i.e. the typical Construction Working Width), and no permanent access would be required for maintenance purposes. Surplus material generated from constructing the Proposed Project would be used
- The appointed Contractor will maintain natural flow rates at all times to protect aquatic life and prevent the interruption of existing downstream uses
- No machinery will operate in-stream. If watercourses have to be traversed during construction these will be bridged prior to commencement of works. Temporary bridging (clear span, beam bridges or plate girder bridges, depending on the span of the crossing) must provide for passage of fish and macroinvertebrates, protect important fish habitats, and prevent erosion and sedimentation. Temporary crossings will be installed in accordance with IFI (2016) guidelines, or as otherwise agreed with IFI during the construction stage

- All site runoff from works in the ZoI of watercourses will be captured and diverted through appropriately and adequately designed facilities to remove sediments and ensure final discharge is within the prescribed limit (i.e. ≤25mg/L total suspended solids in accordance with the Quality of Salmonid Waters Regulations (1988)). Such drainage containment systems will also cater for spill containment. The treated surface water will be discharged to local watercourses, ditches or road drainage as deemed suitable at locations along the pipeline route. There will be no direct discharge of surface waters from the site without prior attenuation and treatment
- Sandbags, silt curtains or similar barriers will be placed downstream to reduce the impact on the watercourses when open cut crossings are required. The water trapped by the sandbags will be pumped out into a nearby sedimentation area/tank located on the riverbank. Any water pumped will be discharged back to the river/stream via geotextile fabric bags, to allow sediment removal before it re-enters aquatic areas; silt fences, 'Sedimats' and geotextile 'dirt bags' will be used, as appropriate
- Where an open cut crossing is proposed, banks will be reinstated using natural materials and revegetated immediately following works. Monitoring of these areas will be undertaken by the EcOW to ensure establishment with remedial works undertaken where required
- The actual footprint of the construction activity for river crossings will be minimised to less than the 50m wide Construction Working Width, where possible (within the confines of the 20m wide Permanent Wayleave). A silt fence will be located immediately downstream of the works within and adjacent to the watercourse. These will be inspected daily, maintained and cleaned regularly during the course of site works. Diversion of water to and from a temporary diversion channel will only take place during the period March to September or as agreed with the IFI
- A silt fence will be provided immediately downstream of the diversion to the existing watercourse
- Where open trench crossings are proposed, the actual footprint of the construction activity will be minimised to less than the maximum corridor width where feasible and will be constructed as close to perpendicular to the axis of the water body channel as engineering and routing conditions permit. The working area will be appropriately fenced to avoid construction vehicle trespass. The watercourse banks, channel profile and bed material will be reinstated following construction using natural materials and to a condition at least as good as prior to construction. Post-construction monitoring of these areas will be undertaken to ensure establishment, with remedial works undertaken where required
- Buffer strips of natural uncleared vegetation will be preserved between construction activity and all rivers, streams and water bodies being crossed by trenchless excavation, i.e. the launch and reception shafts for pipe jacking, will be situated outside of the riparian zone. For watercourses within or adjacent to the Proposed Project, but not crossed by the Proposed Project, where feasible, a buffer zone width of 35m to 60m for larger river channels (>10m wide), and of 20m or greater for smaller channels (<10m wide) will be maintained, or as otherwise agreed with IFI during the Construction Phase
- Refuelling of plant and vehicles will be done on impermeable and bunded areas with hydrocarbon interceptors, not within 10m from any surface water drain or watercourse or within 50m from a borehole or well. A drip tray will be used beneath the fill point during refuelling operations in order to contain any spillages that may occur. Spill-kits and hydrocarbon-absorbent packs will be stored in the cabin of each vehicle and operators will be fully trained in the use of this equipment. If possible, biodegradable oil will be used; biodegradable oil is less toxic than most synthetic oil but would still be used and stored to the same standards as other oils. Plant and equipment will be maintained regularly to ensure that all seals continue to perform effectively
- Temporary stockpiles will be located away from drains and watercourses. Stockpiles will not be located within 10m of a non-sensitive watercourse or within 50m of a sensitive watercourse. The land topography (e.g. slope), soil type, channel width/gradient and critical habitats/species to be protected will be reviewed by the ECoW to determine the exact width of the buffer zone, in consultation with IFI

- Where in-stream bed material is to be removed, coarse aggregates, if present, will be stockpiled at least 10m away from the watercourse for replacement following reinstatement of a watercourse channel. Sediment barriers will be used to prevent the flow of spoil or heavily silt-laden water into any water body
- Management of stockpiles to prevent siltation of watercourse systems through runoff during rainstorms will be required with the final measures to be determined by the appointed Contractor. These may include the following:
  - Allowing the establishment of vegetation on the exposed soil
  - Providing silt fences at the toe of the stockpile to mitigate runoff during rain events
  - Surrounding stockpiles with cut-off ditches to contain runoff
  - Directing any runoff to the site drainage system and to the settlement pond (or other) treatment systems
  - Providing bunds or another form of diversion to keep runoff from entering the stockpile area.
  - Stockpiling of excavated materials from the 38 kV Uprate Works will not be stored within 10m of a watercourse
- Water body buffers (extra work area setbacks, refuelling restrictions, etc.) must be clearly marked in the field with signs and/or highly visible flagging until construction-related ground-disturbing activities are complete
- Direct disposal to the nearby watercourse of arisings from excavations and from groundwater dewatering activities will not be allowed as these could impact both on water quality of the watercourse and increased flood risk. Any discharge of such water, after proper treating/de-silting will be discussed and agreed with the landowner and if necessary, discharge consent will be acquired from the concerned authority (EPA, IFI etc.) prior to the commencement of work
- All aspects of the works will be designed to be watertight. This includes the pipelines, tanks, storage containers, and valve chambers. The specification of pipe materials, fittings, joints, bedding and backfilling details will ensure the integrity of the pipelines and minimise the possibility of any leaks. The design of reinforced concrete structures to be water-retaining and the use of bunds on impervious bases which are able to contain at least 110% of the volume stored around any chemicals and oil storage areas, will reduce the risk of any leaks or accidental spillages
- If during the detailed design or construction stages, it becomes necessary to culvert (CIRIA 2010) any stream or river, then the culverts will be sized in accordance with IFI (2016) guidelines and the OPW's Section 50 consents (OPW 2021) so as not to interfere with upstream and downstream movement of aquatic life or cause an afflux (i.e. backing up of the river increasing the water level); however, this is not anticipated
- The design of the outfalls and settlement ponds and the construction method statements for their installation will be agreed with IFI prior to construction. The area of disturbance of the watercourse bed and bank will be the absolute minimum required for the installation of the outfall
- Any dewatering flows will be directed to the construction drainage system and to the settlement pond (or other) treatment system
- The appointed Contractor and ECoW will inspect and monitor the water quality of surface waters in the ZoI of any works on a daily basis, paying particular attention to silt levels and will ensure repair and maintenance of any sediment and erosion control measures (i.e. silt traps) are carried out as required
- A detailed method statement including pollution prevention measures will be prepared prior to commencement of works. All subcontractors and staff will be made aware of its contents and their responsibilities. Pollution control measures will be included in all method statements and all staff will be made aware of their contents and their responsibilities. Staff will be trained in the implementation of the Incident Response Plan and the use of any spill control equipment as necessary. A training log will be maintained and updated regularly. In the event of an accidental spill, procedures and contingency plans will be in place at each work site to address cleaning up

small spillages as well as dealing with an emergency incident. In the unlikely event of a hydrocarbon spillage, contaminated spill clean-up material will be properly disposed of to an authorised waste contractor. Spill kits will be provided at high risk and/or sensitive sites. Safe handling and legal disposal of contaminated materials and wastes resulting from an incident will be clearly defined. A reporting procedure will be in place for recording pollution incidents for review and future actions for prevention, mitigation and training prior to commencement of construction.

939. During the abstraction of raw water for hydrostatic testing, and subsequent discharge post testing, in order to avoid/reduce significant effects on European sites, abstraction velocities will be kept below 0.15m/s. The performance target will be to not abstract more than 10% of Q95 flow if flow during abstraction is between Q80 flow and Q95 (or as otherwise determined by abstraction licence). There will be no abstraction below a Q95 low flow level (to be determined by monitoring and installation of gauge boards based on Catchment Flood Risk Assessment and Management modelling and monitoring cross referenced). Abstraction will be through a fine mesh not greater than 3mm aperture. The source of abstracted water will be sampled prior to hydrostatic testing and the required water treatment determined based on a decision tree that covers: suspended solids, INNS, and water chemistry. A temporary small-scale intake design of up to approximately 2,000m^3/day (25 l/s) would be developed, in the form of a suspended cage lowered into the mid-stream but not close to the riverbed to avoid drawing in aquatic species that prefer the margins. The treatment process will include filtration and disinfection as a minimum to avoid sediment, organisms and seeds entering the pipeline and be modular to allow for treatment commensurate with the abstraction rate available. The treatment process will also ensure that water being discharged from the pipeline after hydrostatic testing will not cause any environmental impact. The sampling of the abstracted water (as described above) would provide information regarding background contaminants and the potential for INNS and determine the exact treatment required to remove the contaminants. Containerised mobile wastewater treatment plants are available which can provide this service. In addition, sampling of pipeline water prior to discharge will be undertaken to verify this and to determine the treatment(s) required prior to discharge. The same treatment approach will be followed whichever discharge solution is chosen:

- Dechlorination using recommended products during discharge into settlement pond
- pH adjustment in the settlement pond
- Oxygenation on discharge from the settlement pond (if required) using an upturned bellmouth or similar arrangement.

940. A provisional assessment of pipeline sub-sections has been undertaken and suitable local watercourses for discharge of test water identified for each sub-section. In most cases, the watercourse crosses the test section and the section can be fed directly from the source. Occasionally, the sub-section for testing would require an adjacent sub-section to be completed first so that water can be conveyed to the right sub-section. Following a successful completion of the hydrostatic pressure test, the water in the pipeline will, where practicable, be retained and pumped into adjacent sections when they are ready for hydrostatic testing. However, in most instances the water will be drained from the pipeline as far as possible to land within the water catchment area from which it was originally taken. This will avoid any potential issues related to inter-catchment transfer of waters with differing physio-chemical properties.

941. During testing and commissioning, there will be a settlement of water allowed to remove suspended solids and a discharge standard of no greater than 25mg/l suspended solids. A mobile treatment unit such as a ‘Siltbuster’ or similar will be used for solids removal (during testing and commissioning only) where necessary, in order to achieve this discharge standard. The Siltbuster type systems are modular and include mix tanks for the controlled introduction of the dosing system. The latter is housed within a container and includes a chemical dosing skid, and internal storage space for the chemicals within a spill bund. Such systems have been widely used for many years on construction sites by water companies for this purpose. The Siltbuster system has been deployed successfully by United Utilities, which is the United Kingdom’s North West water service provider for Cumbria, Cheshire, Greater Manchester,

Lancashire and Cumbria, for this purpose[21]. No discharges will occur in flood conditions. Discharges from the pipeline will require dechlorination prior to discharge to the environment. This will be achieved by using sodium sulphite dechlorination tablets inserted into perforated wire mesh baskets at the Washout chamber or permanent outfall structure. Dechlorination is achieved almost immediately on contact with the tablets. This method provides the most flexible approach for the removal of low chlorine residual and is suited to the infrequent discharges from Washout Valves. Levels of residual chlorine will be reduced to below <0.005mg/L, as required by the Quality of Salmonid Waters Regulations (1988). All sweetening flow discharges will be monitored for chlorine residual, and de-chlorinated prior to entering any watercourse as part of the embedded design measures. Refer to EIAR Appendix A4.1 (Operational Strategy) for further details.

942. As a result of the potential impacts associated with temporary discharges, a number of controls and features have been designed into the system for discharging from Washout Valves as follows:

- Discharges will be made using flexible hoses where flow rates permit: discharge rates to land drain discharges from Washout Valves will be limited to a maximum of 15l/s; discharge rates to minor water bodies will be limited to a maximum of 25l/s
- Discharge to water bodies will be limited to a maximum of 20% of the stream's median annual flow (Qmed)
- The water will be dechlorinated as necessary, and this would be facilitated by the use of an intermediate chamber at each Washout Valve
- The rate of release will be managed to prevent scour from or increased sediment loads to the receiving watercourses
- The flow of water from the valve chambers to the watercourse will be controlled in accordance with EPA and OPW requirements (post-planning) and will follow a draindown strategy which matches flow to capacity of the receiving watercourse to prevent scour, erosion and increased sediment load in the receiving watercourses, including:
  - Works will be conducted during forecast low flow periods to allow the outfall to be constructed into the bank and onto a dry section of the riverbed
  - A silt curtain will be placed around the new outfall during the construction works to prevent the runoff of silty water into the water body
  - In-stream works will not be carried out during the annual close season for fish migration. The duration of the season varies regionally. The timing of works will be in accordance with IFI guidelines (IFI 2016) or as otherwise agreed with IFI during the construction stage
  - The area of disturbance of the watercourse bed and bank will be the absolute minimum required for the installation of the outfall
  - Outfalls will be at a 45-degree angle and in line and at a level with the watercourse bed
  - The headwall will be set back into the channel banks so it is flush with the bank profile
  - The headwall adjacent to the riverbank will be kept free of vegetation and debris and the riverbank will be checked for scour damage and erosion regularly and defects remedied early
  - If clean water from any Principal Infrastructure Site, the RWRM, or the Treated Water Pipeline is required to be discharged into a watercourse, a baffle will be fitted to the discharge point to prevent disturbance of the watercourse bed.

[21] Siltbuster Case Studies: https://www.siltbuster.co.uk/case-studies/combined-sewer-overflow-case-studies-construction/

7.1.4.4 Habitat Degradation (Air Quality) Mitigation Measures

943. Dust deposition impacts on ecology can occur due to chemical or physical effects. This includes reduction in photosynthesis due to smothering from dust on the plants and chemical changes such as acidity to soils. Often impacts will be reversible once the works are completed and dust deposition ceases. In order to ensure that any potential direct or indirect dust impacts will not affect terrestrial and aquatic vegetation within the Lower River Shannon SAC in the ZoI of the construction works, the appointed Contractor will implement the following measures during the Construction Phase of the Proposed Project:

- Regular inspections of the site and boundary will be carried out to monitor dust. Records and notes on these inspections will be logged
- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is practicable
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site
- Stockpiles and mounds will be kept away from sensitive receptors (at least 50m away from Annex I habitats within a European site), watercourses and surface drains where reasonably practicable, and sited to take into account the predominant wind direction relative to sensitive receptors
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period
- Keep site fencing, barriers and scaffolding clean using wet methods
- Remove materials that have a potential to produce dust from site as soon as practicable, unless being re-used on site. If they are being re-used on-site, cover, seed or fence stockpiles to prevent wind whipping
- Install hard surfaced Construction Roads, which are regularly damped down with fixed or mobile sprinkler systems and regularly cleaned
- Impose and signpost a maximum-speed-limit of 20kph on Construction Roads and work areas (if long Construction Road routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate)
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable). These will be located at least 50m away from Annex I habitats within a European site. An adequate area of hard surfaced road will be provided between the wheel wash facility and the site exit, wherever site size and layout permits
- Acoustic noise barriers will be used around the RWI&PS to mitigate nuisance caused by construction – these will act as a screen and will also have the effect of reducing off-site dust effects.

944. These procedures, which are recommended in the IAQM Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2024), will be strictly monitored and assessed on a daily basis. With these measures in place there will be no adverse effects on the integrity of any European site.

7.1.4.5 Habitat Degradation (Invasive Non-Native Species) Mitigation Measures

945. A Non-Native Invasive Species Management Plan has been prepared and included in the CEMP (EIAR Appendix A5.1) and will be implemented sufficiently far in advance of the proposed construction works commencing so as to allow time to adequately control all target INNS populations within the ZoI of the Proposed Project, having regard to the specific timing/seasonal constraints that apply in relation to each individual species. The Non-Native Invasive Species Management Plan will direct the Contractors in implementing the specific mitigation measures required in relation to individual INNS.

946. The spread and introduction of INNS and noxious weeds during the Construction Phase and Operational Phase will be avoided by adopting appropriate mitigation measures in accordance with guidance issued by TII (TII, 2017; TII 2020), IFI (2010) and Uisce Éireann (2018). Any plant INNS material noted on-site or within 15m of working areas will be treated and/or removed off site and disposed of at appropriate licensed or permitted waste disposal facilities in compliance with the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011). The presence of INNS and requirement for actions will be confirmed and supervised by an ECoW.

947. All plant and equipment employed on the various construction sites (e.g. excavators, footwear, etc.) will be thoroughly cleaned down using a power washer unit into a contained area prior to leaving site at access/egress points, to prevent the spread of INNS aquatic/riparian species, in accordance with the OPW Environmental Standard Operating Procedures (OPW 2011) and/or IFI Biosecurity Protocols (IFI 2010) and the Uisce Éireann Japanese knotweed Information and Guidance Document (Uisce Éireann 2018). Additional care will be taken near watercourses, as water is a fast medium for the dispersal of plant fragments and seeds. In relation to aquatic INNS all construction works, and any aquatic work that will be carried out (e.g. electrofishing and trapping), will comply with best practice biosecurity protocols for aquatic work (IFI 2010).

948. A sign-off sheet will be maintained and checked daily or as required, to confirm cleaning. Staff involved in the works will be informed as to the presence of INNS in the area. All staff working on the Proposed Project will be familiar with the sections within the Management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII 2020) which details the treatment necessary for the pertinent INNS, together with the required reporting procedure if encountered.

949. As the INNS recorded during the baseline surveys may have spread, or their distribution may change, prior to the commencement of construction works, a pre-construction survey within the Proposed Project will be carried out which will focus on INNS listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011. In accordance with the TII guidelines (TII 2020) this survey will produce accurate 1:5,000 scale mapping for the precise location of plant INNS. The pre-construction surveys will be undertaken by suitable experts with competence in identifying the species concerned, having regard to any seasonal constraint.

950. The application of herbicides/pesticides will be undertaken by staff who have sufficient training, experience and knowledge in this area, and which may include achieving competency certification in the safe use of herbicides/pesticides. It is important to note that as machinery and vehicles will be working in a contaminated area, site hygiene measures will be strictly followed. It is also noted that it may not be possible to completely eradicate the invasive species before or during the Construction Phase and ongoing management may be required into the Operational Phase.

951. The Contractor will maintain site hygiene at all times in an area where INNS are present to prevent further spread and will prevent the introduction of INNS to a clean site. The spread and introduction of INNS and noxious weeds will be avoided by adopting appropriate mitigation measures as per guidance issued by TII (TII 2017; TII 2020), IFI (2010) and Uisce Éireann (2018), where relevant. The following site hygiene measures/biosecurity will be implemented, where applicable:

- Infested areas will be fenced off and clearly signed prior to and during construction to avoid spreading seeds or plant fragments around or off the construction site. In relation to knotweed plant species, a 10m buffer around the area will be allowed for areas where infested soil is to be stockpiled on-site and will be clearly identified and marked out and not within 50m of any watercourse or within a flood zone
- Using machinery with tracks in infested areas will be avoided if possible. Vehicles used in the transport of infested material will be visually checked and washed down into a contained area before being used for any other work, either on the same site or at a different site. Material

gathered in dedicated wash down contained areas will be removed off site and disposed of at appropriate licensed or permitted waste disposal facilities

- A dedicated footwear and vehicular wheel wash down facility will be installed in a contained area within the site. All equipment (including footwear) that comes into contact with water or soils will be visually inspected for evidence of attached plant or animal material, or adherent mud or debris. This will be done before leaving the site. Any attached or adherent material will be removed before leaving the site of operation
- Prior to arrival on-site, the Contractor's vehicles and equipment will be thoroughly cleaned in a contained area. High-pressure steam cleaning, with water >60 degrees celsius, is recommended for vehicles and equipment where reasonably feasible. If it is not possible to steam clean the equipment, a normal power hose will be used. After cleaning, equipment will be visually inspected to ensure that all adherent material and debris have been removed

952. If soil is imported to the site for landscaping, infilling or embankments, the Contractor will gain documentation from suppliers that it is free from non-native invasive species. There are different ways that INNS can be managed prior to and during construction depending on the amount of species present and the timing of the proposed works. Where reasonably practicable, advance treatment will be used to allow the prior treatment of INNS prior to construction and to help contain the spread of the infestation. Advance treatment will require permission from landowners. An Advance Treatment Plan will be prepared by a qualified ecologist and will set out details of the area to be treated (including detailed plans), the methods to be used (which will typically be chemical treatment in advance of construction), measures to protect any surrounding habitat areas and any ongoing recommendations for the later Construction Phase.

953. To prevent the clogging and potential spread of zebra mussel, the proposed design for the RWI&PS includes three Inlet Chambers, each fitted with a PWWC Intake Screen, to prevent debris or fish being taken into the raw water pumps. Water will be drawn into the Pumping Station through the screens and into three separate but interconnected Inlet Chambers. Whilst it is proposed that the Passive Intake Screens will be manufactured in a copper nickel alloy material, to minimise the risk of zebra mussel attachment, some proactive non-toxic anti-fouling measures could also be needed to protect the intake pipes from becoming clogged (Section 3.5.7). Internal coating of the pipes will be undertaken to discourage attachment of zebra mussel to the pipe wall.

954. As mentioned in Section 3.5.7, microfilters to prevent the transfer of zebra mussels from Parteen Basin will sit on a manifold located on a loop off the RWRM. Raw water will pass through these units and dirt particles and juvenile mussels will become trapped in the unit, forming a 'filtration cake'. This cake will cause a pressure differential across the unit and, at a predetermined pressure loss, a self-cleaning process will be triggered. When in use, the units will be flushed regularly to clean away any zebra mussels or other waste material trapped in the filters. A filter flush out pipe will carry the washwater to an INNS debris retention tank, located above the RWRM Scour Tank at the northern side of the RWI&PS. The debris will be allowed to settle out in this tank before being removed for disposal off-site. No wastewater will be discharged as a result of this process; a floating arm draw-off pipe will take supernatant liquid from the tank. This liquid will be passed through a UV treatment unit to deactivate any zebra mussel juveniles (veligers) before being returned to the passive screen inlet basin and being pumped back into the RWRM. The use of copper nickel alloy inlet screens and the provision of microfilters on the RWRMs follow best practice and are tried and trusted methods of lowering the risks of zebra mussel infestation. With these design measures in place, there is minimal risk that Operational Phase activities in Parteen Basin have the potential to spread INNS.

955. Following dry inspection of the Intake, its penstocks and chambers, the wet wells will be flooded, the secant piles removed, and the Intake area inspected for integrity of the concrete revetment mats. The Membrane Filters and UV treatment units will be wet commissioned so that water pumped forward is free of INNS.

956. During the abstraction of raw water for hydrostatic testing, and subsequent discharge post testing, in order to avoid/reduce significant effects on European sites, the source of abstracted water will be sampled prior to hydrostatic testing and the required water treatment determined based on a decision tree that covers: suspended solids, INNS, and water chemistry. A temporary small-scale intake design of up to approximately 2,000m^3/day (25l/s) would be developed, in the form of a suspended cage lowered into the mid-stream but not close to the riverbed to avoid drawing in aquatic species that prefer the margins. The treatment process will include filtration and disinfection as a minimum to avoid sediment, organisms and seeds entering the pipeline and be modular to allow for treatment commensurate with the abstraction rate available. The treatment process will also ensure that water being discharged from the pipeline after hydrostatic testing will not cause any environmental impact. The sampling of the abstracted water would provide information regarding background contaminants and the potential for INNS and determine the exact treatment required to remove the contaminants. Containerised mobile wastewater treatment plants are available which can provide this service. The treatment method selected will be sufficient to remove/kill all INNS.

7.1.4.6 Disturbance/Displacement Mitigation Measures

957. Construction noise will be kept to a minimum in accordance with BS 5228-1 (BSI 2014b). The contract documents will specify that the appointed Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures and will comply with the best practice outlined in BS 5228-1 (BSI 2014b) and the Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (NRA 2014b).

958. The construction of the secant piles at Parteen Basin will take approximately three to four weeks. Acoustic screens will be used around the RWI&PS. These screens will be carefully positioned to be as effective as possible. In general, the barriers will be brought as close as possible to either the noise source or the receiving position with no gaps or openings in the joins of the barrier material. The barrier material will have a minimum mass per unit area of 10kg/m^2. The minimum height of the barrier will be such that no part of the noise source will be visible from the receiving point.

959. Although the underwater noise modelling results indicate that fish with a swim bladder involved in hearing are likely to exceed the criteria for recoverable injury within 60m of vibropiling, vibropiling activities will be restricted to the shoreline of Parteen Basin. Silt curtains will be in place before any piling works commence (50m from the shoreline due west, 7m due north, and 23m due south), while the water within the confines of the silt curtains will be electrofished to remove any fish that may have become enclosed, which will be released back into Parteen Basin. Furthermore, the results are based on precautionary parameters, assuming noise exposure for 48 hours in relation to the recoverable injury exceedance, and that a fish would remain stationary within the ZoI of the noise for the whole period. However, the works will take place over approximately a five-to-six-hour duration on a single day. The results indicate behavioural reactions are more likely and fish are expected to temporarily move away from the source of temporary noise. Thus, any disturbance/displacement effects due to noise and vibration associated with the Construction Phase (including the installation of the secant piles in Parteen Basin) are not predicted to result in any significant disturbance to aquatic species including Atlantic salmon and lamprey species. This is principally due to the absence of any in-stream works in Parteen Basin once the secant piles have been constructed, but also in consideration of the temporary nature of any noise and vibration associated with the secant piling, and the short-term nature of general construction works (which would be of a limited duration each day i.e. confined to normal working hours).

960. Where lighting is required, directional lighting (i.e. lighting which only shines on roads and not nearby countryside) will be used to prevent overspill. This will be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvres and shields to direct the light only to the intended area. Exterior lighting will meet the Bat Conservation Trust (2023) lighting guidelines and will be automatically controlled and turned off unless operational staff are present on-site. These lighting guidelines are also

considered appropriate for otter, which require lighting to be directed away from water bodies. The lighting specifications are as follows:

- All luminaires used will lack UV/Infrared elements
- LED luminaires will be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability
- A warm white spectrum (<2700 Kelvins will be used to reduce the blue light component of the LED spectrum)
- Luminaires will feature peak wavelengths higher than 550 nanometer
- Column heights will be carefully considered to minimise light spill. The shortest column height allowed will be used where possible
- Only luminaires with an upward light ratio of 0% and with good optical control will be used
- Luminaires will be mounted on the horizontal, i.e. no upward tilt
- Any external security lighting will be set on motion-sensors and short (one minute) timers
- The positioning of outdoor lighting will be directed away from any adjacent linear habitats (e.g. hedgerows, treelines, rivers, woodland edge) to ensure that there is no light spill onto such habitats.

7.1.4.7 Mortality Risk Mitigation Measures

961. Mammal fencing will be installed around the perimeter of the RWI&PS to prevent otters entering the RWI&PS, WTP, BPT, BPS, FCV and TPR and to guide otters to the mammal passes. Mammal-resistant fencing will be installed in accordance with NRA guidelines (NRA 2008b).

962. Silt generated from construction works, such as construction and removal of the temporary piling platform in Parteen Basin, will be contained by means of a suitable silt curtain installed in Parteen Basin around the work areas. Due to its location on a lake with the potential for moderate wind and wave action, a double row of heavy-duty Type 3 silt curtains are proposed. The silt curtains will be anchored/weighted in place with a float suitable for the site wind/wave conditions. Once the silt curtains are in place and before the sheet piling works commence, the water within the confines of the silt curtains will be electrofished to remove any fish that may have become enclosed, which will be released back into Parteen Basin. A classification system (United States Army Corps Engineers 1997) divided silt curtains into the following three types, according to the prevailing conditions:

- Type 1 – (Light weight) this is designed for use in lower energy environments where there are no currents and the deployment location is sheltered from any wind and waves
- Type 2 – (Medium weight) this is suited to sites where there is only a small to moderate current of up to approximately 1m/s. Wind and wave action can be present but not considered a major force
- Type 3 – (Heavy-duty) is for sites with higher energy environments, with currents in excess of 1.5m/s. Curtains can be deployed in a tidal region and be subject to wind and wave action.

963. In order to minimise the risk of fish or otter becoming entrained or entrapped in the Intake Chamber, PWWC Intake Screens will be fitted to prevent debris and/or fish or otter being taken up into the raw water pumps (i.e. they cannot swim through the screen). Intake velocities through the screen slots would be limited to 0.15m/s by the 3mm slot size, the velocity at which juvenile fish that are known to occur in Parteen Basin can swim away without being trapped/held by the screen, taking into consideration average water temperatures (Department of Communications, Marine and Natural Resources 2005). The maximum flow of 300Mld equates to 3.47m^3/s. The intake is designed to pass the maximum flow through two out of the three screens, which works out at 1.74m^3/s each. The surface area of each screen is 37m^2, so dividing the maximum flow of 1.74m^3/s through each screen by the surface area (37m^2) gives a velocity of only 0.047m/s. This would be the velocity if the raw water pumps were operating

continuously, which will not be the case, so the actual velocity would typically be lower than this. A bubble curtain will also be provided at the inlet to the chamber housing the PWWC Intake Screens. The bubble curtain is a system that produces fine bubbles of air across the entrance to the intake structure, which act as a barrier (a curtain) further discouraging fish from entering the intake.

7.1.4.8 Barrier Effect Mitigation Measures

964. To avoid the crossings upstream of the Lower River Shannon SAC presenting a barrier to lamprey and Atlantic salmon, in-stream works will not be carried out during the annual close season. The duration of the season varies regionally, and some watercourses have late spawning salmonids. Construction works within/adjacent to watercourses will be in accordance with IFI guidelines (IFI 2016) or as otherwise agreed with IFI during the construction stage.

965. In order to mitigate potential barrier effects on otter, for the trenchless excavations, no works will be undertaken within the riparian zone (i.e. between the launch and reception shafts and the watercourse itself). This will allow otter to move freely up and down the watercourse along the riparian corridor during the Construction Phase. A 1m wide otter run/ledge will be provided between the site security fence and the edge of the Intake Chamber Structure. For the open cut excavations, mammal walkways will be constructed in accordance with 'Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes' (NRA 2008b).

7.1.5 Residual Impacts

966. This section discusses the residual impacts associated with the proposed RWI&PS and how the mitigation measures proposed in Section 7.1.4 would ensure that the potential impacts associated with the Proposed Project would not affect the integrity of the Lower River Shannon SAC.

967. None of the habitat area disturbed within the Lower River Shannon SAC, either temporarily or permanently, corresponds with Annex I habitat types, none are qualifying interests of the SAC, and none provide a supporting role to any qualifying interest habitats within the SAC. Bankside and riparian habitat loss, or modification, associated with the construction of the RWI&PS would not impact upon breeding or resting places or affect the populations of otter, Atlantic salmon, sea lamprey, river lamprey or brook lamprey in the Lower River Shannon SAC. Therefore, any habitat loss associated with the proposed RWI&PS would not affect the conservation objective attributes and targets supporting the conservation condition of the qualifying interest habitats and species of the Lower River Shannon SAC. Therefore, there are no residual habitat loss/fragmentation impacts associated with the RWI&PS.

968. The Proposed Project has the potential to cause habitat degradation within the ZoI of the Proposed Project during the Construction Phase and/or the Operational Phase as a result of excavation, hydrological/water quality impacts, air quality impacts and/or the introduction or spread of INNS. There is the potential for the conservation objectives of the Lower River Shannon SAC to be negatively affected. However, mitigation measures will be implemented to ensure that the receiving environment is protected and the conservation objectives of the Lower River Shannon SAC are not negatively affected by the Proposed Project. There are therefore, no residual direct or indirect impacts associated with the Proposed Project that could adversely affect the integrity of the Lower River Shannon SAC.

969. The proposed RWI&PS may cause temporary disturbance or displacement of otter, Atlantic salmon, sea lamprey, river lamprey and/or brook lamprey during the Construction Phase or the Operational Phase. However, with appropriate mitigation measures in place this temporary disturbance would not affect the conservation objective attributes and targets supporting the conservation condition of the qualifying interest species of the Lower River Shannon SAC. Therefore, there are no residual direct or indirect impacts that could adversely affect the integrity of the Lower River Shannon SAC.

970. The design of the proposed RWI&PS limits the mortality risk to the qualifying interest species of the Lower River Shannon SAC by using a bankside design for the RWI. However, some levels of mortality risk are posed by the possibility of accidently dropping construction materials into Parteen Basin during construction of the Intake or by fish becoming entrained in the Intake. The employment of secant piles to construct the Intake Chamber in Parteen basin and the use of PWWC Intake Screens would mitigate these risks by containing construction materials within the secant piles and preventing fish becoming entrained, respectively. Therefore, the mortality of qualifying interest species would not occur or affect the conservation objective attributes and targets supporting the conservation condition of qualifying interest species of the Lower River Shannon SAC. Therefore, there are no residual direct or indirect impacts that could adversely affect the integrity of the Lower River Shannon SAC.

7.1.6 Conclusion of Assessment for Lower River Shannon SAC 2165

971. None of the potential direct or indirect impacts associated with the Proposed Project would affect the conservation objectives of any of the qualifying interest habitats or species of the Lower River Shannon SAC. Mitigation measures are included to ensure the retention and protection of qualifying interest habitats, to ensure that the structural integrity and functioning of the habitats within the SAC are not affected during the Construction Phase or Operational Phase. These measures would ensure the protection of the receiving air and water environments, to prevent the spread/introduction of plant INNS within and to the SAC and to ensure that the Proposed Project does not present a mortality risk or barrier to the movement of the otter, salmon and lamprey populations of the SAC. Refer to Table 7.5 for how these mitigation measures relate back to the qualifying interests and conservation objectives of the Lower River Shannon SAC.

972. The examination, analysis and evaluation covered all relevant information in respect of the qualifying interest habitats and species of the SAC. This included the potential impacts, mitigation and prevention measures, and whether or not the predicted impacts would affect the conservation objectives that support the conservation condition for the qualifying interests concerned (either directly or indirectly; refer to Section 8 for the in-combination assessment). It has been concluded beyond reasonable scientific doubt that, subject to the implementation of mitigation measures, the Proposed Project would not adversely affect the integrity of Lower River Shannon SAC.

7.2 Lisduff Fen SAC 2147

7.2.1 Qualifying Interests and Conservation Objectives of Lisduff Fen SAC 2147

973. The qualifying interest Annex I habitats and species of the Lisduff Fen SAC, and the overall conservation objective for each, are listed in Table 7.6.

Table 7.6: Qualifying Interests and Conservation Objectives of Lisduff Fen SAC (NPWS 2019d)

Qualifying Interests	Conservation Objectives
Annex I Habitats	
*Petrifying springs with tufa formation (*Cratoneurion*) [7220]	To restore favourable conservation condition
Alkaline fens [7230]	To maintain favourable conservation condition
Annex II Species	
Geyer's whorl snail - *Vertigo geyeri* [1013]	To restore favourable conservation condition

974. Two of the qualifying interests for Lisduff Fen SAC have a 'restore favourable conservation condition' objective, with the remaining qualifying interest having a 'maintain favourable conservation condition' objective. Section 7.2.1 to Section 7.2.6 provides details on the qualifying interests and the conservation objectives, summarises the baseline description, and assesses the potential direct and/or indirect impacts associated with the Proposed Project which may affect the conservation objectives of any of the qualifying interest habitats or species of the Lisduff Fen SAC.

975. In conjunction with considering the generic conservation objective, to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected, the available site-specific conservation objectives document for Lisduff Fen SAC (NPWS 2019d) also informed this assessment. This document sets out the attributes, measures and targets that define the favourable conservation condition of qualifying interest habitats and species within the European site.

7.2.2 Ecological Baseline Description for Lisduff Fen SAC 2147

976. Lisduff Fen is situated about 4km south-east of Birr in County Offaly, near Kilcolman crossroads. Lisduff Fen SAC comprises a wet alkaline fen, with typical fen and marsh species such as black bog-rush, common reed, few-flowered spike-rush and grass-of-parnassus. Included as part of the fen system are areas of wet grassland, some birch (*Betula* sp.) and willow (*Salix* sp.) scrub, and some vegetation more akin to that of raised bog, with species such as heather and bog-myrtle. There is a small stand of Scots Pine at the eastern margin of the site. On the western side, the fen merges into wet grassland which has been improved to varying degrees for pasture (DAHG 2013b).

977. A fast-flowing stream which flows into the fen at the south end is heavily encrusted with calcium carbonate or 'tufa' deposits. Bryophytes recorded include: *Fontinalis antipyretica*, *Amblystegium riparium*, *Aneura pinguis* and *Rhynchostegium riparioides*. Higher plants in the stream include branched bur-reed (*Sparganium erectum*), watercress (*Nasturtium officinale*) and water mint (*Mentha aquatica*). While key diagnostic bryophytes of the *Cratoneurion* community were not recorded, this vegetation is considered to correspond to the Habitats Directive Annex I habitat 'petrifying springs with tufa formation' (DAHG 2013b).

978. Of major conservation and scientific significance at Lisduff Fen SAC is the presence of a population of the rare Geyer's whorl snail, a species associated with calcareous fens, where it occurs at the base of small sedges (*Carex* spp.) and black bog-rush, where these are growing at the water edge. The sites are often in open, tufa-forming calcareous spring flushes with a stable water table and of mesotrophic type. A survey in 1995 confirmed the presence of the species at Lisduff. During a monitoring and condition assessment carried out between 2008 and 2010 on behalf of the DAHG, the presence of Geyer's whorl snail was again confirmed. The habitat was considered to be excellent for the species and there were no apparent threats (DAHG 2013b).

979. The Proposed Project boundary is located 490m directly east of the Lisduff Fen SAC boundary and does not overlap with this European site. The Rock (Birr)_020 stream (SC: 25_13119) forms the eastern boundary of the SAC with a fen area located to the west of the stream. The Proposed Project boundary is predominately underlain by gravelly till derived from limestones. Further to the east (between the proposed pipeline and the Rock (Birr)_020; SC: 25_13119), small areas of gravel are mapped. This is evident in a number of small gravel extraction areas. The groundwater vulnerability is mapped as moderate vulnerability which indicates that the depth to bedrock is generally greater than 5m.

980. The underlying aquifer is a locally important aquifer and part of the Shinrone GWB which extends over an area of 350km^2. No rock outcrops are recorded along the Proposed Project in the area near Lisduff Fen SAC. Groundwater flow paths are generally short in the Shinrone GWB, in the order of 30-300m, with groundwater discharging to the streams and rivers that traverse the aquifer. Groundwater along the Proposed Project discharges over a short distance to the Rock (Birr)_020 and a network of drainage ditches which are located along the local roads. Elevated electrical conductivity values (680µS/cm) near Kilcolman Church indicate groundwater discharges to the stream. The gaining streams form a hydrological boundary between the Proposed Project and the fen area.

981. The qualifying interests at the site include Geyer's whorl snail and petrifying springs. Historical records indicated that the distribution of Geyer's whorl snail is confined to a petrifying spring 810m from the Proposed Project; the species, however, was not recorded at this site within the SAC during a more recent survey in 2016 (NPWS 2019d). The hydrogeological ZoI of the Proposed Project does not extend to 810m and poses no risk of hydrogeological effects within Lisduff Fen SAC. However, the Proposed Project does cross the Rock [Birr] River which drains to Lisduff Fen SAC c.1.1km away (refer to Appendix J: Watercourse Crossings and Pathways to European Sites, for more details and EIAR Figure 8.4 to Figure 8.108 for the locations of the watercourse crossings).

7.2.3 Examination and Analysis of Potential Direct and Indirect Impacts

982. As the Proposed Project does not overlap with the Lisduff Fen SAC, none of the qualifying interest habitats or species would be directly impacted. Lisduff Fen SAC (and potential ex-situ sites) also lies beyond the ZoI of any hydrogeological or disturbance/displacement impacts.

983. However, in the absence of mitigation measures, the Proposed Project's indirect impacts described in the following sections could potentially affect the conservation objective attributes and targets supporting the conservation condition of the qualifying interests of Lisduff Fen SAC.

7.2.3.1 Construction Phase

7.2.3.1.1 Habitat Degradation as a Result of Excavation and Tunnelling

984. The only influence tunnelling or excavation works associated with the Proposed Project could have on Lisduff Fen SAC is indirectly, during the pipeline installation works at the watercourse crossings, where there is a risk of water quality impacts in the receiving watercourses regardless of whether open cut or trenchless techniques are used. This is discussed further below in the hydrological impacts section.

7.2.3.1.2 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

985. As the Proposed Project crosses the Rock [Birr] River which drains to Lisduff Fen SAC, construction works at these watercourse crossings pose a risk of affecting water quality in the European site through increasing silt-sediment loading, accidental spillage of cement-based products, accidental spillage of hydrocarbons or through faecal contamination arising from on-site toilets and washing facilities.

986. Affecting water quality in receiving watercourses and in Lisduff Fen SAC has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats hydrologically linked to the Rock [Birr] River.

987. Hydrostatic pressure testing would be carried out on the Treated Water Pipelines. It is proposed to abstract water from eight water bodies along the route and use the abstracted 'test water' to pressure test the pipeline (Section 5.1.2.2). This water would then be discharged through the use of washouts to land or to water bodies, or tankered away where required. In addition, there are a total of 51 Line Valves along the pipeline route. Two of these are located on the RWRMs and the other 49 are located along the Treated Water Pipeline. The two Line Valves on the RWRMs would not have washouts. Twenty of the

49 Line Valves along the Treated Water Pipeline would have washouts. Washouts at Line Valves would only be used to discharge the sweetening flows during final filling in the Commissioning Phase and the washout design flow would vary between 1l/s and 4l/s. The water used to test the pipeline would be released via one of these 20 Line Valve Washouts. These are detailed in Annex A (Water Body Crossings and Washout Valves – Detailed Assessment) of EIAR Appendix A9.2 (Pipeline Assessment). Such activities in the ZoI of the Lisduff Fen SAC or its tributaries may affect water quality in the European site and has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats hydrologically linked to the European site. Mitigation measures are detailed in Section 7.1.4.3.

7.2.3.1.3 Habitat Degradation as a Result of Air Quality Impacts

988. During the Construction Phase, the Proposed Project would generate dust which could affect vegetation within the Lisduff Fen SAC. The effects of air pollution on vegetation and habitats are generally greatest within 50 to 100m of a development but effects can extend up to 200m which is considered the maximum distance or the ZoI for the Proposed Project. The Alkaline Fen area is located to the west of the Rock (Birr)_020 (SC: 25_13119) which is over 500m from the Proposed Project. Therefore, there would not be any effects on qualifying interest habitat in the Lisduff Fen SAC.

7.2.3.1.4 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

989. As the Proposed Project would involve instream construction works on watercourses that drain to Lisduff Fen SAC, there is the potential that INNS could be introduced to the surface water network and establish populations downstream in the European site.

990. Introducing INNS to Lisduff Fen SAC has the potential to affect the conservation objectives supporting the conservation condition of some of the qualifying interest habitats.

7.2.3.2 Operational Phase

7.2.3.2.1 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

991. Although there would not be any routine discharges to the surface water network during the Operational Phase, repair and maintenance works in the ZoI of the Rock [Birr] River may require excavations to repair or replace sections of pipeline which pose a risk of affecting water quality in the surface water network.

992. Affecting water quality in the Rock [Birr] River and in Lisduff Fen SAC has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats hydrologically linked to the Rock [Birr] River.

7.2.3.2.2 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

993. During the Operational Phase, repair and maintenance works may be required to sections of the pipeline within the Proposed Project, which cross the Rock [Birr] River that drains to Lisduff Fen SAC. There is a risk that plant INNS may colonise lands within the 20m wide Permanent Wayleave post-construction and therefore, a risk that repair and maintenance works could potentially introduce INNS to the surface water network and establish populations downstream in the European site.

994. Introducing INNS to Lisduff Fen SAC has the potential to affect the conservation objectives supporting the conservation condition of some of the qualifying interest habitats.

7.2.3.2.3 Summary

995. Table 7.7 presents a summary of the potential impacts on the qualifying interests of Lisduff Fen SAC as a result of the Proposed Project and how these impacts affect the site's conservation objectives. Those highlighted in blue are the qualifying interests which are present within the ZoI of the Proposed Project that could potentially be impacted.

Table 7.7: Qualifying Interests of Lisduff Fen SAC and Summary of Potential Impacts

Qualifying Interests	Potential Impacts	
	Construction Phase	Operational Phase
Annex I Habitats		
*Petrifying springs with tufa formation (*Cratoneurion*) [7220]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
Alkaline fens [7230]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
Annex II Species		
Geyer's whorl Snail – (*Vertigo geyeri*) [1013]	Habitat degradation – water quality impacts	Habitat degradation – water quality impacts

996. The specific attributes and targets used to define the conservation objectives of the qualifying interest habitats and species of the Lisduff Fen SAC are presented in Table 7.8, along with the potential impacts associated with the Proposed Project. Those qualifying interests, and the supporting attributes, measures, and targets at risk of being affected by the Proposed Project are highlighted in blue.

Table 7.8: Potential Impacts on the Conservation Objectives of the Lisduff Fen SAC

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
***Petrifying springs with tufa formation (*Cratoneurion*) [7220]** **To maintain or restore the favourable conservation condition of the habitat in Lisduff Fen SAC, which is defined by the following list of attributes and targets:**				
Habitat area (square metres)	Area stable or increasing, subject to natural processes.	No Petrifying springs develop as a result of hydrogeological processes. As discussed in Section 5.1.2.3, a petrifying spring is located in the western fen area at the toeslope of a large limestone ridge. As the underlying geology comprises poorly productive limestones, the only groundwater source area from this spring is to the west of the spring. The area to the east of Rock (Birr)_020, where the Proposed Project is located, does not provide groundwater flow to the fen area. Given the Lisduff Fen SAC site location and its qualifying interests, the Proposed Project would not cause potential dewatering that could impact the petrifying springs, which are located on the opposite side of the (western boundary) SAC over 800m away. Lisduff Fen SAC lies outside of the hydrogeological ZoI of the Proposed Project, which therefore cannot affect the functioning or extent of the spring sites (i.e. affect the quality or quantity of groundwater flows and tufa deposition that support the associated vegetation community) or the area covered by, or distribution of, petrifying spring habitat in the SAC.	No	No potential for effects.
Habitat distribution (occurrence)	No decline, subject to natural processes.			
Hydrological regime: height of water table; water flow (metres; metres per second)	Maintain appropriate hydrological regimes.			
Water quality – nitrate level (mg/l)	No increase from baseline nitrate level and less than 10mg/l.	Yes Characteristically, petrifying spring water has high values for pH, alkalinity and dissolved calcium and is oligotrophic (nutrient poor). Although the Proposed Project lies upstream of the Lisduff Fen SAC, given the nature of the Proposed Project, it poses no risk of affecting nutrient levels (i.e., nitrate and phosphate) in receiving watercourses downstream. However, an accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water chemistry in receiving watercourses (at least temporarily), depending upon the pollutant involved.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on aquatic or wetland habitats in Lisduff Fen SAC are avoided (Section 7.1.4, where that section's content is appropriate).	No potential for effects, following the implementation of mitigation measures.
Water quality – phosphate level (mg/l)	No increase from baseline phosphate level and less than 15µg/l.			
Vegetation composition: positive indicator species (number per spring)	At least three positive/high quality indicator species as listed in Lyons and Kelly (2016) and no loss from baseline number.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on sensitive plant species associated with petrifying spring sites (at least locally) where the springs have a direct interaction with the Rock (Birr) Stream. Lisduff Fen SAC is 490m directly west of the Proposed Project boundary and approximately 1.1km from where the Proposed Project crosses the Rock [Birr] River which drains to the SAC. Therefore, there is a risk that	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on aquatic or wetland habitats in Lisduff Fen SAC are avoided (Section 7.1.4, where that section's content is appropriate).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: negative indicator species (cover Dominant, Abundant, Frequent, Occasional, Rare (DAFOR) scale)	Potentially negative indicator species should not be Dominant or Abundant; invasive species should be absent.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation structure: sward height (cm)	Field layer height between 10cm and 50cm (except for bryophyte-dominated ground <10cm).	during the Construction Phase and/or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via the Rock (Birr) Stream, to petrifying springs within the SAC. Both of these potential impacts could affect the composition of the vegetation communities associated with any petrifying spring sites.	Measures to prevent the spread of INNS during the Construction Phase and the Operational Phase would be implemented to ensure they are not introduced to Lisduff Fen SAC (Section 7.1.4, where that section's content is appropriate).	
Physical structure: trampling/dung (cover (DAFOR) scale)	Cover should not be Dominant or Abundant.	No Petrifying springs develop as a result of hydrogeological processes, which are likely fed by a groundwater source to the west of the spring, and not that of the area east of Rock (Birr)_020, where the Proposed Project is located. Given the Lisduff Fen SAC site location and its qualifying interests, the Proposed Project would not cause any potential impacts to the physical structure of petrifying springs, which are located on the opposite side of the (western boundary) SAC over 800m away. Lisduff Fen SAC lies outside of the hydrogeological ZoI of the Proposed Project, which therefore cannot affect the functioning or extent of the spring sites (i.e. affect the quality or quantity of groundwater flows and tufa deposition that support the associated vegetation community) or the area covered by, or distribution of, petrifying spring habitat in the SAC.	No	No potential for effects.
Alkaline fens [7230] **To maintain or restore the favourable conservation condition of the habitat in Lisduff Fen SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality in the Rock (Birr) Stream and any associated alkaline fen habitat in Lisduff Fen SAC. Lisduff Fen SAC is 490m directly west of the Proposed Project boundary and approximately 1.1km from where the Proposed Project crosses the Rock [Birr] River which drains to the SAC. Therefore, there is a risk that during the Construction Phase and/or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via the Rock (Birr) Stream, to alkaline fen habitat within the SAC. These impacts could negatively affect the area of alkaline fen habitat in Lisduff Fen SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in Lisduff Fen SAC are avoided (Section 7.1.4, where that section's content is appropriate). Measures to prevent the spread of INNS during the Construction Phase and the Operational Phase would be implemented to ensure they are not introduced to Lisduff Fen SAC (Section 7.1.4, where that section's content is appropriate).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Habitat distribution (occurrence)	No decline, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality in the Rock (Birr) Stream and any associated alkaline fen habitat in Lisduff Fen SAC. Lisduff Fen SAC is 490m directly west of the Proposed Project boundary and approximately 1.1km from where the Proposed Project crosses the Rock [Birr] River which drains to the SAC. Therefore, there is a risk that during the Construction Phase and/or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via the Rock (Birr) Stream, to alkaline fen habitat within the SAC. These impacts could negatively affect the distribution of alkaline fen habitat in Lisduff Fen SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in Lisduff Fen SAC are avoided (Section 7.1.4, where that section's content is appropriate). Measures to prevent the spread of INNS during the Construction Phase and the Operational Phase would be implemented to ensure they are not introduced to Lisduff Fen SAC (Section 7.1.4, where that section's content is appropriate).	No potential for effects, following the implementation of mitigation measures.
Ecosystem function: soil nutrients (soil pH and appropriate nutrient levels at a representative number of monitoring stops)	Maintain soil pH and nutrient status within natural ranges.	No Although the Proposed Project lies upstream of Lisduff Fen SAC, given the nature of the Proposed Project, it poses no risk of affecting nutrient levels in receiving watercourses downstream or in alkaline fen habitat in the SAC.	No	No potential for effects.
Ecosystem function: peat formation (percentage cover of peat-forming vegetation and water table levels)	Maintain active peat formation, where appropriate.	No The Rock (Birr) Stream would be crossed by the Proposed Project c.1.1km directly from and upstream of Lisduff Fen SAC, and this is the only watercourse within the SAC supporting the alkaline fen habitat. The pipeline at the Rock (Birr) Stream crossing would be installed using open cut techniques and although there is a risk of temporary (ranging from one week up to one month in a worst-case scenario) changes to the hydrological regime during the Construction Phase, these temporary changes would not have a significant effect on active peat formation which occurs over a long period of time with the formation rate of about 1mm per year (Charman 2002), nor would they have a significant effect on the natural hydrological regime necessary to support the natural structure and functioning of alkaline fen habitat. There is no long-term or permanent risk to the functioning of the hydrological regime supporting alkaline fen habitat at Lisduff Fen SAC, thus there is no potential for adverse effects on the integrity of the site.	No	No potential for effects.
Ecosystem function: hydrology – groundwater levels (water levels (centimetres); duration of levels; hydraulic gradients)	Maintain, or where necessary restore, appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat.			
Ecosystem function: hydrology - surface water flow (drain density and form)	Maintain, or where necessary restore, as close as possible to natural or semi-natural drainage conditions.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Ecosystem function: water quality (water chemistry measures)	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality in the Rock (Birr) Stream which passes through Lisduff Fen SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in Lisduff Fen SAC are avoided (Section 7.1.4, where that section's content is appropriate).	No potential for effects, following the implementation of mitigation measures.
Community diversity (abundance of variety of vegetation communities)	Maintain variety of vegetation communities, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality in the Rock (Birr) Stream and any associated alkaline fen habitat in Lisduff Fen SAC. Lisduff Fen SAC is 490m directly west of the Proposed Project boundary and approximately 1.1km from where the Proposed Project crosses the Rock [Birr] River which drains to the SAC. Therefore, there is a risk that during the Construction Phase and/or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via the Rock (Birr) Stream, to alkaline fen habitat within the SAC. These impacts could negatively affect the diversity of vegetation communities or the vegetation composition, and the abundance of positive brown moss indicator species associated with alkaline fen habitat in Lisduff Fen SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in Lisduff Fen SAC are avoided (Section 7.1.4, where that section's content is appropriate). Measures to prevent the spread of INNS during the Construction Phase and the Operational Phase would be implemented to ensure they are not introduced to Lisduff Fen SAC (Section 7.1.4, where that section's content is appropriate).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: brown mosses (percentage cover at a representative number of 2m x 2m monitoring stops)	Maintain adequate cover of typical brown moss species.			
Vegetation composition: typical vascular plants (percentage cover at a representative number of 2m x 2m monitoring stops)	Maintain adequate cover of typical vascular plant species.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality in the Rock (Birr) Stream and any associated alkaline fen habitat in Lisduff Fen SAC. Lisduff Fen SAC is 490m directly west of the Proposed Project boundary and approximately 1.1km from where the Proposed Project crosses the Rock [Birr] River which drains to the SAC. Therefore there is a risk that during the Construction Phase and/or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via the Rock (Birr) Stream, to alkaline fen habitat within the SAC. These impacts could negatively affect vegetation composition, and the abundance of vascular plant positive indicator species, associated with alkaline fen habitat in Lisduff Fen SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in Lisduff Fen SAC are avoided (Section 7.1.4, where that section's content is appropriate). Measures to prevent the spread of INNS during the Construction Phase and the Operational Phase would be implemented to ensure they are not introduced to Lisduff Fen SAC (Section 7.1.4, where that section's content is appropriate).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation composition: native negative indicator species (percentage cover at a representative number of 2m x 2m monitoring stops)	Cover of native negative indicator species at insignificant levels.	Yes Lisduff Fen SAC is 490m directly west of the Proposed Project boundary and approximately 1.1km from where the Proposed Project crosses the Rock [Birr] River which drains to the SAC. Therefore, there is a risk that during the Construction Phase and/or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via the Rock (Birr) Stream, to alkaline fen habitat within the SAC. An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality in the Rock (Birr) Stream and any associated alkaline fen habitat in Lisduff Fen SAC. These impacts could negatively affect the vegetation composition of alkaline fen habitat in Lisduff Fen SAC and provide suitable conditions/opportunities for negative indicator species to establish.	Yes Measures to prevent the spread of INNS during the Construction Phase and the Operational Phase would be implemented to ensure they are not introduced to Lisduff Fen SAC (Section 7.1.4, where that section's content is appropriate). Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in Lisduff Fen SAC are avoided (Section 7.1.4, where that section's content is appropriate).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: non-native species (percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops)	Cover of non-native species less than 1%.	Yes Lisduff Fen SAC is 490m directly west of the Proposed Project boundary and approximately 1.1km from where the Proposed Project crosses the Rock [Birr] River which drains to the SAC. Therefore, there is a risk that during the Construction Phase and/or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via the Rock (Birr) Stream, to alkaline fen habitat within the SAC. This impact could negatively affect the vegetation composition of alkaline fen habitat in Lisduff Fen SAC.	Yes Measures to prevent the spread of INNS during the Construction Phase and the Operational Phase would be implemented to ensure they are not introduced to Lisduff Fen SAC (Section 7.1.4, where that section's content is appropriate).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: native trees and shrubs (percentage cover in local vicinity of a representative number of monitoring stop)	Cover of scattered native trees and shrubs less than 10%.	No The Rock (Birr) Stream is the only potential impact pathway connecting the Proposed Project to alkaline fen habitat within Lisduff Fen SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of increasing the cover of native trees and shrubs or increasing soft rush or common reed cover.	No	No potential for effects.
Vegetation composition: soft rush and common reed cover (percentage cover in local vicinity of a representative number of monitoring stops)	Total cover of soft rush (*Juncus effusus*) and common reed (*Phragmites australis*) less than 10%.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation structure: litter (percentage cover in local vicinity of a representative number of monitoring stops)	Total cover of litter not more than 25%.	Yes Lisduff Fen SAC is 490m directly west of the Proposed Project boundary and approximately 1.1km from where the Proposed Project crosses the Rock [Birr] River which drains to the SAC. Therefore, there is a risk that during the Construction Phase and/or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via the Rock (Birr) Stream, to alkaline fen habitat within the SAC. This could negatively affect vegetation height in alkaline fen habitat in Lisduff Fen SAC.	Yes Measures to prevent the spread of INNS during the Construction Phase and the Operational Phase would be implemented to ensure they are not introduced to Lisduff Fen SAC (Section 7.1.4, where that section's content is appropriate).	No potential for effects, following the implementation of mitigation measures.
Physical structure: disturbed bare ground (percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops)	Cover of disturbed bare ground less than 10%.	No The Rock (Birr) Stream is the only potential impact pathway connecting the Proposed Project to alkaline fen habitat within Lisduff Fen SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of increasing the percentage cover of disturbed bare ground.	No	No potential for effects.
Physical structure: tufa formations (percentage cover in local vicinity of a representative number of 2m x 2m monitoring stops)	Disturbed proportion of vegetation cover where tufa is present is less than 1%.	No The Proposed Project is remote from Lisduff Fen SAC and would not involve any works within the SAC that would result in drainage of alkaline fen habitat or that would disturb tufa formations or any vegetation associated with alkaline fen habitat.	No	No potential for effects.
Indicators of local distinctiveness (occurrence and population size)	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes. This includes species on the Flora (Protection) Order, 2022 and/or the red data lists.	Yes Lisduff Fen SAC is 490m directly west of the Proposed Project boundary and approximately 1.1km from where the Proposed Project crosses the Rock [Birr] River which drains to the SAC. Therefore, there is a risk that during the Construction Phase and/or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via the Rock (Birr) Stream, to alkaline fen habitat within the SAC. An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality in the Rock (Birr) Stream and any associated alkaline fen habitat in Lisduff Fen SAC. These impacts could negatively affect the vegetation composition, and the abundance of locally distinctive species, in alkaline fen habitat in Lisduff Fen SAC.	Yes Measures to prevent the spread of INNS during the Construction Phase and the Operational Phase would be implemented to ensure they are not introduced to Lisduff Fen SAC (Section 7.1.4, where that section's content is appropriate). Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in Lisduff Fen SAC are avoided (Section 7.1.4, where that section's content is appropriate).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Geyer's Whorl Snail - *Vertigo geyeri* [1013] **To maintain or restore the favourable conservation condition of the species in Lisduff Fen SAC, which is defined by the following list of attributes and targets:**				
Distribution (number of occupied 1km squares)	No decline, subject to natural processes. There is one known site for this species in the SAC within N0800.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the wetland habitats supporting *Vertigo geyeri* in Lisduff Fen SAC such that individuals are killed and/or the affected habitat becomes unsuitable for occupation (at least temporarily). This could affect the number of occupied sites in the SAC, or the number of positive samples in suitable habitat or area of suitable habitat within the SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on wetland habitats in the Lisduff Fen SAC are avoided (Section 7.1.4, where that section's content is appropriate).	No potential for effects, following the implementation of mitigation measures.
Occurrence in suitable habitat (percentage positive records in a representative number of samples)	No decline, subject to natural processes.			
Habitat area (hectares)	Area of suitable habitat stable or increasing, subject to natural processes; no less than 2ha of at least suboptimal habitat.			
Habitat quality: vegetation structure and height (Assessment in a representative number of samples)	No decline, subject to natural processes.			
Habitat quality: soil wetness (percentage of a representative number of monitoring stops)	No decline, subject to natural processes; at least 50% of a representative number of sample points in areas of optimal habitat should be classified as optimal wetness; at least 25% in areas of suboptimal habitat.	No The Proposed Project boundary is c.490m from the SAC site boundary. Groundwater along the Proposed Project discharges over a short distance to the Rock (Birr)_020 and a network of drainage ditches which are located along the local roads. A number of gaining streams/drainage ditches (i.e. fed by groundwater baseflow) are located between the Proposed Project and the SAC, located in interdrumlin hollows. The gaining streams form a hydrological boundary between the Proposed Project and the fen area. Therefore, the Proposed Project poses no risk of affecting soil moisture levels in Lisduff Fen SAC.	No	No potential for effects.

7.2.4 Design Requirements and Mitigation Measures

997. The positioning of the infrastructure associated with the Proposed Project has been designed to avoid European sites, where possible, and to minimise the risks of direct and indirect effects as far as is possible. The design measures are described in Section 3.5.

7.2.4.1 Construction Phase Mitigation

998. The mitigation measures to protect water quality in the receiving environment during the Construction Phase are as detailed in Section 7.1.4.3 and in the CEMP (see EIAR Appendix A5.1) and include, for example: the use of sandbags, silt curtains or similar barriers, buffers of natural uncleared vegetation, and suspension of works within and adjacent to watercourses during periods of heavy rainfall. Such mitigation measures are considered best practice and are in accordance with IFI (2016) guidelines.

999. The mitigation measures to ensure that dust deposition impacts will not affect terrestrial or aquatic vegetation within the Lisduff Fen SAC during the Construction Phase are as detailed in Section 7.1.4.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example, wheel washing facilities, speed restrictions, and watering and sweeping of roads. These measures are in accordance with IAQM (2024) guidelines.

1000. The mitigation measures to ensure that INNS are not spread or introduced to Lisduff Fen SAC during the Construction Phase are as detailed in Section 7.1.4.5 and in the CEMP (see EIAR Appendix A5.1) and include, for example, the thorough cleaning of plant and equipment using a power washer unit prior to leaving site in accordance with the OPW Environmental Standard Operating Procedures (OPW 2011) and/or IFI Biosecurity Protocols (IFI 2010).

7.2.4.2 Operational Phase Mitigation

1001. The mitigation measures to protect water quality in the receiving environment during the Operational Phase are similar to those required during testing and commissioning and are as detailed in Section 7.1.4.3 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

1002. The mitigation measures to ensure that INNS are not spread or introduced to Lisduff Fen SAC during the Operational Phase are also similar to those required during testing and commissioning and are as detailed in Section 7.1.4.5 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

7.2.5 Residual Impacts

1003. The Proposed Project has the potential to negatively affect water quality in the receiving surface water environment during the Construction Phase and the Operational Phase and, as the Rock [Birr] River is crossed by the Proposed Project and it drains to Lisduff Fen SAC, there is the potential for the conservation objectives of Lisduff Fen SAC to be negatively affected. Mitigation measures will be implemented to ensure that the receiving surface water network is protected and the conservation objectives of Lisduff Fen SAC are not negatively affected by the Proposed Project.

1004. The Proposed Project has the potential to cause habitat degradation during the Construction Phase as a result of air quality impacts. There is the potential for the conservation objectives of the Lisduff Fen SAC to be negatively affected. However, mitigation measures will be implemented to ensure that the receiving environment within the ZoI of the Proposed Project is protected and the conservation objectives of the Lisduff Fen SAC are not negatively affected by the Proposed Project.

1005. The Proposed Project has the potential to spread and introduce INNS to Lisduff Fen SAC via the Rock [Birr] River, which drains to Lisduff Fen SAC. Mitigation measures will be implemented to ensure that any INNS present within the Construction Working Width or the 20m wide Permanent Wayleave are controlled and are not spread to the Lisduff Fen SAC, and that the conservation objectives of Lisduff Fen SAC are not negatively affected by the Proposed Project.

1006. There are therefore no residual direct or indirect impacts associated with the Proposed Project that could adversely affect the integrity of Lisduff Fen SAC.

7.2.6 Conclusion of Assessment for Lisduff Fen SAC 2147

1007. Mitigation measures are included to ensure that water quality in the receiving surface water environment is protected and that INNS are not spread or introduced to the Lisduff Fen SAC. None of the potential direct or indirect impacts associated with the Proposed Project would affect the conservation objectives of any of the qualifying interest habitats or species of Lisduff Fen SAC.

1008. The examination, analysis and evaluation covered all relevant information in respect of the qualifying interest habitats and species of the SAC. This included the potential impacts, mitigation and prevention measures, and whether or not the predicted impacts would affect the conservation objectives that support the conservation condition for the qualifying interests concerned (either directly or indirectly; refer to Section 8 for the in-combination assessment). It has been concluded beyond reasonable scientific doubt that, subject to the implementation of mitigation measures, the Proposed Project would not adversely affect the integrity of Lisduff Fen SAC.

7.3 Sharavogue Bog SAC 0585

7.3.1 Qualifying Interests and Conservation Objectives of Sharavogue Bog SAC 0585

1009. The qualifying interest Annex I habitats and species of the Sharavogue Bog SAC 0585, and the overall conservation objective for each, are listed in Table 7.9.

Table 7.9: Qualifying Interests and Conservation Objectives of Sharavogue Bog SAC 0585 (NPWS 2015)

Qualifying Interests	Conservation Objectives
Annex I Habitats	
*Active raised bogs [7110]	To restore favourable conservation condition
Degraded raised bogs still capable of natural regeneration [7120]	The long-term aim for degraded raised bogs still capable of natural regeneration is that the peat-forming capability is re-established; therefore, the conservation objective for this habitat is inherently linked to that of active raised bogs (7110) and a separate conservation objective is not usually set.
Depressions on peat substrates of the *Rhynchosporion* [7150]	Depressions on peat substrates of the *Rhynchosporion* is an integral part of good quality active raised bogs (7110) and thus a separate conservation objective is not usually set for the habitat in Sharavogue Bog SAC.

1010. In conjunction with considering the generic conservation objective, to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected, the available site-specific conservation objectives document for Sharavogue Bog SAC (NPWS 2015) also informed this assessment. This document sets out the attributes, measures and targets that define the favourable conservation condition of qualifying interest habitats and species within the European site.

7.3.2 Ecological Baseline Description for Sharavogue Bog SAC 0585

1011. Sharavogue Bog SAC comprises two raised bog sites. The main area, Sharavogue Bog, which covers 223.43ha is located about 8km south of Birr, County Offaly, in the Little Brosna Valley. Cangort (Kilfrancis) Bog is a small outlier 4km further south and covers 13.12ha. The Sharavogue section is situated between the River Little Brosna and an elevated ridge of Carboniferous limestone. It includes 137ha of uncut raised bog and 86.43ha of surrounding areas which include cutover bog, wet grassland, semi-natural woodland, and an area of wet lagg vegetation in the cutover along the eastern margin of the bog. The eastern edge is bounded by a disused railway embankment, and the western edge by the river. The bog is underlain by low permeability limestone and limestone till. Cangort (Kilfrancis) Bog comprises a sub-section of Cangort Bog NHA (site code 000890), which has been restored as part of an EU LIFE project (European Commission 2008). The site consists of 2.53ha of high bog and 10.59ha of cutover, most of which was afforested in the 1970s. It is bounded by open high bog to the west, cutover with scrub to the north and south-west and by agricultural fields to the east and south. In addition to the conifer plantations on the high bog and cutover, deciduous woodland is present on cutover bog at the southern and eastern margins of the site. A tributary of the Little Brosna River to the east and south drains the site. The underlying geology is Carboniferous limestone (DAHG 2017).

1012. Active raised bog (ARB) comprises areas of high bog that are wet and actively peat forming, where the percentage cover of bog mosses (*Sphagnum spp*.) is high, and where some or all of the following features occur: hummocks, pools, wet flats, Sphagnum lawns, flushes and soaks. Degraded raised bog corresponds to those areas of high bog where the hydrology has been adversely affected by peat cutting, drainage and other land use activities, but which are capable of regeneration to active raised bog within 30 years. The *Rhynchosporion* habitat occurs in wet depressions, pool edges and erosion channels where the vegetation includes white beak-sedge (*Rhynchospora alba*) and/or brown beak-sedge (*R.*

fusca), and at least some of the following associated species: bog asphodel (*Narthecium ossifragum*), sundews (*Drosera* spp.), deergrass (*Trichophorum germanicum*) and carnation sedge (*Carex panicea*) (DAHG 2017).

1013. Sharavogue Bog is one of the few remaining raised bogs in Ireland situated on a floodplain. It has a well-developed dome of uncut peat which is long and relatively narrow. Active raised bog covers 25.8ha and mainly occurs in the central and southern part of the dome, but lacks any extensive areas of quaking hummock/hollow/pools as a result of long-term drying out caused by peat cutting and marginal and river drainage. In addition, drains were inserted across about 60% of the high bog dome in the early 1990s. All the typical vascular plant species for the active raised bog habitat such as heather, cottongrasses (*Eriophorum angustifolium* and *E. vaginatum*), deergrass, bog asphodel and white beak-sedge are common and the Midland raised bog indicator species bog-rosemary (*Andromeda polifolia*) and cranberry (*Vaccinium oxycoccos*) are present. The dominant micro-topography consists of sphagnum hummocks and hollows. Pools are scarce and *Sphagnum cuspidatum* filled lawn-like depressions are very occasional. The overall *sphagnum* cover ranges from 51 to 75% (DAHG 2017).

1014. Whilst the surface is generally quite dry, there are some small pools and lawns where *Rhynchosporion* vegetation is well represented. Here the dominant species are *Sphagnum cuspidatum*, white beak-sedge, common cottongrass (*Eriophorum angustifolium*) and great sundew (*Drosera anglica*). The rare brown beak-sedge also occurs. *Rhynchosporion* vegetation is also well-developed in extensive wet cut-away areas which occur along the eastern margins of the high bog. Other plant species of the raised bog which are less common are bog-rosemary, cranberry and roundleaved sundew (*Drosera rotundifolia*).

1015. Within the cutover zone along the eastern margins of the site there is upwelling of base-rich water and these areas now support carr woodland and calcareous fen vegetation. Areas of wet lagg vegetation such as this are very rare in the country and the lagg system at Sharavogue is one of the best-developed in the country. The rare semi-aquatic plant species slender cottongrass (*Eriophorum gracile*) has been recently discovered growing in fen vegetation at this site. This species is legally protected under the Flora (Protection) Order, 2022. The nationally rare shrub alder buckthorn (*Frangula alnus*), a Red Data Book species, occurs in dry bog woodland on cut-away. On the western side the site, the vegetation grades from high bog, through fringing woodland, to alluvial wet grassland by the Little Brosna River (DAHG 2017).

1016. Cangort Bog NHA is a remnant of a larger area of bog, much of which has now been cutover and reclaimed for forestry and agriculture, with only 58ha of high bog remaining. No active raised bog habitat is present but, based on hydrological modelling an area of 6.28ha is considered to be degraded raised bog habitat. In the SAC section of Cangort Bog NHA, Cangort (Kilfrancis), the high bog supported an open canopy of small Sitka spruce, which was spreading further onto the open high bog. The afforested areas on the high bog and cutover were clear-felled and the associated drains blocked in 2014. With the clear-felling of all the conifers some vegetation is regenerating with, in the drier areas, heather, bramble, willow-herb (*Epilobium* spp.), common gorse, bracken, birch seedlings (*Betula pubescens*) and the moss *Hypnum jutlandicum*. On some of the wettest areas of the cutover, heather dominates the ground flora with purple moor-grass, bracken, bramble, the lichen *Cladonia portentosa* along with the mosses *Hypnum jutlandicum*, *Sphagnum subnitens* and *Sphagnum palustre*. Saplings of birch and willow (*Salix* spp.) are regenerating in these areas and are developing into wet native birch woodland. Adjacent to the southern stream a more mesotrophic wet woodland is developing with birch dominating accompanied by ash, alder and oak (*Quercus* sp.) (DAHG 2017).

1017. The Proposed Project boundary is located approximately 2km south of Sharavogue Bog SAC boundary and does not overlap with this European site. The Proposed Project and Sharavogue Bog are located in separate WFD River Sub Basins, Little Brosna_030 and Little Brosna_040 respectively. A number of gaining streams/drainage ditches are located between the Proposed Project and the SAC, in interdrumlin hollows. Given the relatively low permeability limestones and generally short flowpaths, in the order of 30-300m in the Shinrone GWB, groundwater discharges to the streams and rivers that traverse the aquifer. Elevated electrical conductivity values (650µS/cm), also indicate groundwater discharge to the streams. The gaining streams form a hydrological boundary between the Proposed Project and the raised bog areas (refer to Appendix J: Watercourse Crossings and Pathways to European Sites, for more details and EIAR Figure 8.4 to Figure 8.108 for the locations of the watercourse crossings). The hydrogeological ZoI of the Proposed Project does not extend to Sharavogue Bog SAC and poses no risk of significant hydrogeological effects to the qualifying interests.

7.3.3 Examination and Analysis of Potential Direct and Indirect Impacts

1018. The Proposed Project is remote (approximately 2km) from Sharavogue Bog SAC and would not involve any works within or adjacent to the SAC (and potential ex-situ sites) that would affect the local hydrological or hydrogeological regimes that support the raised bog habitat, nor would the Proposed Project inhibit any efforts to restore it. Sharavogue Bog SAC is downstream of the Proposed Project and the Shinrone Stream and Little Brosna River pass through/adjacent to Sharavogue Bog SAC. Raised bog habitat is primarily rainwater fed, draining to the surrounding drainage network and streams/rivers. Therefore, any potential impacts to water quality in the Shinrone Stream and Little Brosna River during the Construction Phase pose no risk of affecting the area, distribution, vegetation quality or vegetation composition of adjacent raised bog habitat.

1019. However, in the absence of mitigation measures, the Proposed Project's impacts described in the following sections could potentially affect the conservation objective attributes and targets supporting the conservation condition of the qualifying interests of Sharavogue Bog SAC.

7.3.3.1 Construction Phase

7.3.3.1.1 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1020. Hydrostatic pressure testing would be carried out on the Treated Water Pipelines. It is proposed to abstract water from eight water bodies along the route and use the abstracted 'test water' to pressure test the pipeline (Section 5.1.2.2). This water would then be discharged through the use of washouts to land or to water bodies, or tankered away where required. In addition, there are a total of 51 Line Valves along the pipeline route. Two of these are located on the RWRMs and the other 49 are located along the Treated Water Pipeline. The two Line Valves on the RWRMs would not have washouts. Twenty of the 49 Line Valves along the Treated Water Pipeline would have washouts. Washouts at Line Valves would only be used to discharge the sweetening flows during final filling in the Commissioning Phase and the washout design flow would vary between 1l/s and 4l/s. The water used to test the pipeline would be released via one of these 20 Line Valve Washouts. These are detailed in Annex A (Water Body Crossings and Washout Valves – Detailed Assessment) of EIAR Appendix A9.2 (Pipeline Assessment). Such activities in the ZoI of the Sharavogue Bog SAC or its tributaries may affect water quality in the European site and has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats hydrologically linked to the European site. Mitigation measures are detailed in Section 7.1.4.3.

7.3.3.1.2 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1021. As the Proposed Project would involve instream construction works on the Shinrone Stream and Little Brosna River which pass through/run adjacent to Sharavogue Bog SAC, there is the potential that INNS could be introduced to the surface water network and establish populations downstream along the boundaries of the European site and potentially encroaching further within the site.

1022. Introducing INNS to Sharavogue Bog SAC has the potential to affect the conservation objectives supporting the conservation condition of the qualifying interest habitats.

7.3.3.2 Operational Phase

7.3.3.2.1 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1023. During the Operational Phase, repair and maintenance works may be required to sections of the pipeline within the Proposed Project, which cross watercourses that run through/adjacent to the Sharavogue Bog SAC. There is a risk that plant INNS may colonise lands within the 20m wide Permanent Wayleave post-construction and therefore, a risk that repair and maintenance works could potentially introduce INNS to the surface water network and establish populations downstream along the boundaries of the European site and potentially encroaching further within the European site.

1024. Introducing INNS to Sharavogue Bog SAC has the potential to affect the conservation objectives supporting the conservation condition of some of the qualifying interest habitats.

7.3.3.3 Summary

1025. Table 7.10 presents a summary of the potential impacts on the qualifying interests of Sharavogue Bog SAC as a result of the Proposed Project and how these impacts affect the site's conservation objectives. Those highlighted in blue are qualifying interests which are present within the ZoI of the Proposed Project that could potentially be impacted.

Table 7.10: Qualifying Interests of Sharavogue Bog SAC and Summary of Potential Impacts

Qualifying Interests		Potential Impacts	
		Construction Phase	Operational Phase
Annex I Habitats			
*Active raised bogs [7110]	Habitat degradation – INNS	Habitat degradation – INNS	
Degraded raised bogs still capable of natural regeneration [7120]	Habitat degradation – INNS	Habitat degradation – INNS	
Depressions on peat substrates of the *Rhynchosporion* [7150]	Habitat degradation – INNS	Habitat degradation – INNS	

1026. The specific attributes and targets used to define the conservation objectives of the qualifying interest habitats and species of the Sharavogue Bog SAC are presented in Table 7.11, along with the potential impacts associated with the Proposed Project. Those qualifying interests, and the supporting attributes, measures, and targets at risk of being affected by the Proposed Project are highlighted in blue.

Table 7.11: Potential Impacts on the Conservation Objectives of the Sharavogue Bog SAC

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
***Active raised bogs [7110]** **To maintain or restore the favourable conservation condition of the habitat in Sharavogue Bog SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Restore area of active raised bog, subject to natural processes.	No The Proposed Project boundary is remote (c.2km) from Sharavogue Bog SAC boundary and would not involve any works within or adjacent to the SAC that would affect the local hydrological or hydrogeological regimes that support the raised bog habitat, nor would the Proposed Project inhibit any efforts to restore it. Sharavogue Bog SAC is downstream of the Proposed Project and the Shinrone Stream and Little Brosna River pass through/adjacent to Sharavogue Bog SAC. Raised bog habitat is primarily rainwater fed, draining to the surrounding drainage network and streams/rivers. Therefore, any potential impacts to water quality in the Shinrone Stream and Little Brosna River during the Construction Phase pose no risk of affecting the area, distribution, vegetation quality or vegetation composition of adjacent raised bog habitat.	No	No potential for effects.
Habitat distribution (occurrence)	Restore the distribution and variability of active raised bog across the SAC.			
High bog area (hectares)	No decline in extent of high bog necessary to support the development and maintenance of active raised bog.			
Hydrological regime: water levels (centimetres)	Restore appropriate water levels throughout the site.			
Hydrological regime: flow patterns (flow direction; slope)	Restore, where possible, appropriate high bog topography, flow directions and slopes.			
Transitional areas between high bog and adjacent mineral soils (including cutover areas) (hectares; distribution)	Restore adequate transitional areas to support/protect active raised bog and the services it provides.			
Vegetation quality: central ecotope, active flush, soaks, bog woodland (hectares)	Restore 20.5ha of central ecotope/active flush/soaks/bog woodland as appropriate.			
Vegetation quality: microtopographical features (hectares)	Restore adequate cover of high quality microtopographical features.			
Vegetation quality: bog moss (*Sphagnum*) species (percentage cover)	Restore adequate cover of bog moss (*Sphagnum*) species to ensure peat-forming capacity.			
Typical active raised bog species: flora (occurrence)	Restore, where appropriate, typical active raised bog flora.			
Typical active raised bog species: fauna (occurrence)	Restore, where appropriate, typical active raised bog fauna.			

Attributes and Measures	**Target**	**Potential Impacts Requiring Mitigation?**	**Are Mitigation Measures Required?**	**Conclusion**
Elements of local distinctiveness (occurrence)	Maintain features of local distinctiveness, subject to natural processes.	Cont. - as above	Cont. - as above	Cont. - as above
Negative physical indicators (percentage cover)	Negative physical features absent or insignificant.			
Vegetation composition: native negative indicator species (percentage cover)	Native negative indicator species at insignificant levels.			
Water quality (hydrochemical measures)	Water quality on the high bog and transitional areas close to natural reference conditions.			
Air quality: nitrogen deposition (kg N/ha/year)	Air quality surrounding bog close to natural reference conditions. The total N deposition should not exceed 5kg N/ha/yr.	No The Proposed Project boundary is remote (2km) from Sharavogue Bog SAC boundary and poses no risk of affecting nitrogen deposition levels.	No	No potential for effects.
Vegetation composition: INNS (percentage cover)	Non-native invasive species at insignificant levels and not more than 1% cover.	Yes The Shinrone Stream and Little Brosna River which intersect the Proposed Project, pass through/adjacent to the Sharavogue Bog SAC. Considering the proximity there is a risk that during the Construction Phase and/or the Operational Phase, INNS capable of colonising terrestrial or bog habitats could be spread to Sharavogue Bog SAC, potentially affecting raised bog habitat within the SAC. This impact could negatively affect the vegetation composition of raised bog habitat in Sharavogue Bog SAC.	Yes Measures to prevent the spread of INNS during the Construction Phase and the Operational Phase would be implemented to ensure they are not introduced to Sharavogue Bog SAC (Section 7.1.4, where that section's content is appropriate).	No potential for effects, following the implementation of mitigation measures.
Degraded raised bogs still capable of natural regeneration [7120] **The long-term aim for degraded raised bogs still capable of natural regeneration is that the peat-forming capability is re-established; therefore, the conservation objective for this habitat is inherently linked to that of active raised bogs (7110)**				
See Active raised bogs [7110] above for potential impacts and mitigation measures				

Attributes and Measures	**Target**	**Potential Impacts Requiring Mitigation?**	**Are Mitigation Measures Required?**	**Conclusion**
Depressions on peat substrates of the *Rhynchosporion* [7150] **Depressions on peat substrates of the *Rhynchosporion* is an integral part of good quality active raised bogs (7110) and thus a separate conservation objective is not usually set**				
Habitat area: Hectares	Area stable or increasing, subject to natural processes.	No The Proposed Project boundary is remote (2km) from Sharavogue Bog SAC boundary and would not involve any works within, or adjacent to, the SAC that would affect the local hydrological or hydrogeological regimes that support *Rhynchosporion* habitat, nor would the Proposed Project inhibit any efforts to restore it. Sharavogue Bog SAC is downstream of the Proposed Project and the Shinrone Stream and Little Brosna River pass through/adjacent to Sharavogue Bog SAC. *Rhynchosporion* habitat is an integral part of active raised bog habitat. Raised bog habitat is primarily rainwater fed, draining to the surrounding drainage network and streams/rivers. Therefore, any potential impacts to water quality in the Shinrone Stream and Little Brosna River during the Construction Phase pose no risk of affecting the area, distribution, vegetation quality or vegetation composition of adjacent raised bog habitat.	No	No potential for effects.
Habitat distribution: Occurrence	No decline, subject to natural processes.			
Ecosystem function: soil nutrients – Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range.			
Vegetation composition: positive indicator species - Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species at each monitoring stop is at least five.			
Vegetation composition: *Rhynchospora spp*. – Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of white beaked sedge (*Rhynchospora alba*) and brown beaked sedge (*R. fusca*) at least 10%.			
Vegetation composition: potential dominant species – Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of each of the potential dominant species individually less than 35%.			
Vegetation composition: negative indicator species – Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%.			
Vegetation composition: native trees and shrubs – Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 10%.			
Vegetation structure: *Sphagnum* condition – Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the *Sphagnum* cover is crushed, broken and/or pulled up.			

Attributes and Measures	**Target**	**Potential Impacts Requiring Mitigation?**	**Are Mitigation Measures Required?**	**Conclusion**
Vegetation structure: signs of browsing – Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Last complete growing season's shoots of ericoids, crowberry (*Empetrum nigrum*) and bog-myrtle (*Myrica gale*) showing signs of browsing collectively less than 33%.	Cont. - as above	Cont. - as above	Cont. - as above
Vegetation structure: burning – Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning			
Physical structure: disturbed bare ground – Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%.			
Physical structure: drainage – Percentage area in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%.			
Physical structure: erosion – Percentage area in local vicinity of a representative number of monitoring stops	Less than 5% of the greater bog mosaic comprises erosion gullies and eroded areas.			
Indicators of local distinctiveness – Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat.			
Vegetation composition: non-native species – Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%.	Yes The Shinrone Stream and Little Brosna River which intersect the Proposed Project, pass through/adjacent to the Sharavogue Bog SAC. Considering the proximity there is a risk that during the Construction Phase and/or the Operational Phase, INNS capable of colonising terrestrial or bog habitats could be spread to Sharavogue Bog SAC, potentially affecting raised bog habitat within the SAC. This impact could negatively affect the vegetation composition of raised bog habitat in Sharavogue Bog SAC.	Yes Measures to prevent the spread of INNS during the Construction Phase and the Operational Phase would be implemented to ensure they are not introduced to Sharavogue Bog SAC (Section 7.3.4, where appropriate).	No potential for effects, following the implementation of mitigation measures.

7.3.4 Design Requirements and Mitigation Measures

1027. The positioning of the infrastructure associated with the Proposed Project has been designed to avoid European sites, where possible, and to minimise the risks of direct and indirect effects as far as is possible. The design measures are described in Section 3.5.

7.3.4.1 Construction Phase Mitigation

1028. The mitigation measures to ensure that INNS are not spread or introduced to Sharavogue Bog SAC during the Construction Phase are as detailed in Section 7.1.4.5 and in the CEMP (see EIAR Appendix A5.1) and include, for example, the thorough cleaning of plant and equipment using a power washer unit prior to leaving site in accordance with the OPW Environmental Standard Operating Procedures (OPW 2011) and/or IFI Biosecurity Protocols (IFI 2010).

7.3.4.2 Operational Phase Mitigation

1029. The mitigation measures to ensure that INNS are not spread or introduced to Sharavogue Bog SAC during the Operational Phase are similar to those required during testing and commissioning and are as detailed in Section 7.1.4.5 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

7.3.5 Residual Impacts

1030. The Proposed Project has the potential to spread and introduce INNS to Sharavogue Bog SAC via the surface water network associated with the Shinrone Stream and Little Brosna River, which flow through/adjacent to Sharavogue Bog SAC. Mitigation measures, as detailed in Section 7.1.4, will be implemented to ensure that any INNS present within the Construction Working Width or the 20m wide Permanent Wayleave are controlled and are not spread to Sharavogue Bog SAC, and that the conservation objectives of Sharavogue Bog SAC are not negatively affected by the Proposed Project.

1031. There are therefore, no residual direct or indirect impacts associated with the Proposed Project that could adversely affect the integrity of Sharavogue Bog SAC.

7.3.6 Conclusion of Assessment for Sharavogue Bog SAC 0585

1032. Mitigation measures are included to ensure that INNS are not spread or introduced to Sharavogue Bog SAC. None of the potential direct or indirect impacts associated with the Proposed Project would affect the conservation objectives of any of the qualifying interest habitats of Sharavogue Bog SAC.

1033. The examination, analysis and evaluation covered all relevant information in respect of the qualifying interest habitats and species of the SAC. This included the potential impacts, mitigation and prevention measures, and whether or not the predicted impacts would affect the conservation objectives that support the conservation condition for the qualifying interests concerned (either directly or indirectly; refer to Section 8 for the in-combination assessment). It has been concluded beyond reasonable scientific doubt that, subject to the implementation of mitigation measures, the Proposed Project would not adversely affect the integrity of Sharavogue Bog SAC.

7.4 River Barrow and River Nore SAC 2162

7.4.1 Qualifying Interests and Conservation Objectives of River Barrow and River Nore SAC 2162

1034. The qualifying interest Annex I habitats and species of the River Barrow and River Nore SAC, and the overall conservation objective for each, are listed in Table 7.12.

Table 7.12: Qualifying Interests and Conservation Objectives of River Barrow and River Nore SAC (NPWS 2025c)

Qualifying Interests	Conservation Objectives
Annex I Habitats	
Estuaries [1130]	To maintain favourable conservation condition
Mudflats and sandflats not covered by seawater at low tide [1140]	To maintain favourable conservation condition
Reefs [1170]	To maintain favourable conservation condition
Salicornia and other annuals colonising mud and sand [1310]	To maintain favourable conservation condition
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	To restore favourable conservation condition
Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	To restore favourable conservation condition
Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	To maintain favourable conservation condition
European dry heaths [4030]	To maintain favourable conservation condition
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]	To maintain favourable conservation condition
* Petrifying springs with tufa formation (*Cratoneurion*) [7220]	To maintain favourable conservation condition
Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	To restore favourable conservation condition
* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]	To restore favourable conservation condition
Annex II Species	
Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016]	To maintain favourable conservation condition
Freshwater pearl mussel (*Margaritifera margaritifera*) [1029]	To restore favourable conservation condition
White-clawed crayfish (*Austropotamobius pallipes*) [1092]	To maintain favourable conservation condition
Sea lamprey (*Petromyzon marinus*) [1095]	To restore favourable conservation condition
Brook lamprey (*Lampetra planeri*) [1096]	To restore favourable conservation condition
River lamprey (*Lampetra fluviatilis)* [1099]	To restore favourable conservation condition
Twaite shad (*Alosa fallax)* [1103]	To restore favourable conservation condition
Atlantic salmon (*Salmo salar*) (only in fresh water) [1106]	To restore favourable conservation condition
Otter (*Lutra lutra*) [1355]	To restore favourable conservation condition
Killarney fern (*Trichomanes speciosum*) [1421]	To maintain favourable conservation condition

1035. In conjunction with considering the generic conservation objective, to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected, the available site-specific conservation objectives document for the River Barrow and River Nore SAC (NPWS 2025c) also informed this assessment. This document sets out the attributes, measures and targets that define the favourable conservation condition of qualifying interest habitats and species within the European site.

7.4.2 Ecological Baseline Description for River Barrow and River Nore SAC 2162

1036. This site consists of the freshwater stretches of the Barrow and Nore River catchments as far upstream as the Slieve Bloom Mountains, and also includes the tidal elements and estuary as far downstream as Creadan Head in Waterford. The larger of the many tributaries include the Lerr, Fushoge, Mountain, Aughavaud, Owenass, Boherbaun and Stradbally Rivers of the Barrow, and the Delour, Dinin, Erkina, Owveg, Munster, Arrigle and King's Rivers on the Nore (DHLGH 2024b).

1037. Good examples of alluvial forest (a priority habitat on Annex I of the Habitats Directive) are seen at Rathsnagadan, Murphy's of the River, in Abbeyleix estate and along other shorter stretches of both the tidal and freshwater elements of the site. Typical species seen include almond willow (*Salix triandra*), white willow (*S. alba*), rusty willow, crack willow (*S. fragilis*) and osier (*S. viminalis*), along with iris (*Iris pseudacorus*), hemlock water-dropwort (*Oenanthe crocata*), wild angelica (*Angelica sylvestris*), thin-spiked wood-sedge (*Carex strigosa*), pendulous sedge (*C. pendula*), meadowsweet (*Filipendula ulmaria*), common valerian (*Valeriana officinalis*) and the Red Data Book species nettle-leaved bellflower (*Campanula trachelium*) (DHLGH 2024b).

1038. A good example of petrifying springs with tufa formations occurs at Dysart Wood along the Nore. This is a rare habitat in Ireland and one listed with priority status on Annex I of the Habitats Directive. These hard water springs are characterised by lime encrustations, often associated with small waterfalls. A rich bryophyte flora is typical of the habitat and two diagnostic species, *Palustriella commutata* and *Eucladium verticillatum*, have been recorded (DHLGH 2024b).

1039. The best examples of old oak woodlands are seen in the ancient Park Hill woodland in the estate at Abbeyleix; at Kyleadohir, on the Delour, Forest Wood House, Kylecorragh and Brownstown Woods on the Nore; and at Cloghristic Wood, Drummond Wood and Borris Demesne on the Barrow, though other patches occur throughout the site. Abbeyleix Woods is a large tract of mixed deciduous woodland which is one of the only remaining true ancient woodlands in Ireland. Park Hill is also the site of two rare plants, nettle-leaved bellflower and the moss *Leucodon sciuroides*. The rare Myxomycete fungus, *Licea minima* has been recorded from woodland at Abbeyleix. Oak woodland covers parts of the valley side south of Woodstock and is well developed at Brownsford where the Nore takes several sharp bends. The steep valley side is covered by oak (*Quercus* spp.), holly (*Ilex aquifolium*), hazel and downy birch, with some beech (*Fagus sylvatica*) and ash (*Fraxinus excelsior*). All the trees are regenerating through a cover of bramble, foxglove (*Digitalis purpurea*), great wood-rush (*Luzula sylvatica*) and broad buckler-fern. On the steeply sloping banks of the River Nore, about 5km west of New Ross, in County Kilkenny, Kylecorragh Woods form a prominent feature in the landscape. This is an excellent example of relatively undisturbed, relict oak woodland with a very good tree canopy. Borris Demesne contains a very good example of a semi-natural broadleaved woodland in very good condition (DHLGH 2024b).

1040. Eutrophic tall herb vegetation occurs in association with the various areas of alluvial forest and elsewhere where the floodplain of the river is intact. Characteristic species of the habitat include meadowsweet, purple loosestrife (*Lythrum salicaria*), marsh ragwort (*Senecio aquaticus*), ground ivy (*Glechoma hederacea*) and hedge bindweed (*Calystegia sepium*). Indian balsam (*Impatiens glandulifera*), an introduced INNS, is abundant in places (DHLGH 2024b).

1041. Floating river vegetation is well represented in the Barrow and in the many tributaries of the site. In the Barrow the species found include water-starworts (*Callitriche* spp.), Canadian pondweed, bulbous rush (*Juncus bulbosus*), water-milfoils (*Myriophyllum* spp.), the pondweed *Potamogeton* x *nitens*, broadleaved pondweed, fennel pondweed (*Stuckenia pectinata*), perfoliated pondweed and crowfoots (*Ranunculus* spp.) (DHLGH 2024b).

1042. Dry heath at the site occurs in pockets along the steep valley sides of the rivers especially in the Barrow Valley and along the Barrow tributaries where they occur in the foothills of the Blackstairs Mountains. On the steep slopes above New Ross the Red Data Book species Greater Broomrape (*Orobanche rapum-*

genistae) has been recorded. Close to the Blackstairs Mountains, in the foothills associated with the Aughnabrisky, Aughavaud and Mountain Rivers there are small patches of wet heath (DHLGH 2024b).

1043. Salt meadows occur at the southern section of the site in old meadows where the embankment has been breached, along the tidal stretches of in-flowing rivers below Stokestown House, in a narrow band on the channel side of common reed beds and in narrow fragmented strips along the open shoreline. In the larger areas of salt meadow, notably at Carrickcloney, Ballinlaw Ferry and Rochestown on the west bank; Fisherstown, Alderton and Great Island to Dunbrody on the east bank, the Atlantic and Mediterranean sub types are generally intermixed. At the upper edge of the salt meadow in the narrow ecotonal areas bordering the grasslands where there is significant percolation of salt water, the legally protected species Borrer's saltmarsh-grass (*Puccinellia fasciculata*) and meadow barley (*Hordeum secalinum*) are found. The very rare and also legally protected divided sedge (*Carex divisa*) is also found. Sea rush (*Juncus maritimus*) is also present. Other plants recorded and associated with salt meadows include sea aster, thrift, sea couch (*Elymus athericus*), spear-leaved orache (*Atriplex prostrata*), lesser sea-spurrey, sea arrowgrass and sea plantain. Glassworts (*Salicornia* spp.) and other annuals colonising mud and sand are found in the creeks of the saltmarshes and at the seaward edges of them. The habitat also occurs in small amounts on some stretches of the shore free of stones (DHLGH 2024b).

1044. The estuary and the other Habitats Directive Annex I habitats within it form a large component of the site. Extensive areas of intertidal flats, comprising substrates ranging from fine, silty mud to coarse sand with pebbles/stones are present. Good quality intertidal sand and mudflats have developed on a linear shelf on the western side of Waterford Harbour, extending for over 6km from north to south between Passage East and Creadan Head, and in places are over 1km wide. The dunes which fringe the strand at Duncannon are dominated by marram (*Ammophila arenaria*) towards the sea. Other species present include wild clary/sage (*Salvia verbenaca*), a rare Red Data Book species. The rocks around Duncannon ford have a rich flora of seaweeds typical of a moderately exposed shore and the cliffs themselves support a number of coastal species on ledges, including thrift, rock samphire (*Crithmum maritimum*) and buck's-horn plantain (*Plantago coronopus*). Other habitats which occur throughout the site include wet grassland, marsh, reedswamp, improved grassland, arable land, quarries, coniferous plantations, deciduous woodland, scrub and ponds (DHLGH 2024b).

1045. Seventeen Red Data Book plant species have been recorded within the site, most in the recent past. These are Killarney fern (*Trichomanes speciosum*), divided sedge, clustered clover (*Trifolium glomeratum*), red hemp-nettle (*Galeopsis angustifolia*), Borrer's saltmarsh-grass, meadow barley, opposite-leaved pondweed, meadow saffron/autumn crocus (*Colchicum autumnale*), wild clary/sage (*Salvia verbenaca*), nettle-leaved bellflower, saw-wort (*Serratula tinctoria*), bird cherry (*Prunus padus*), blue fleabane (*Erigeron acris*), fly orchid (*Ophrys insectifera*), ivy broomrape (*Orobanche hederae*), basil thyme (*Acinos arvensis*), and greater broomrape (DHLGH 2024b). Of these, the first eight are protected under the Flora (Protection) Order, 2022.

1046. The site is very important for the presence of a number of Habitats Directive Annex II animal species including freshwater pearl mussel (both *Margaritifera margaritifera* and *M. m. durrovensis*), white-clawed crayfish, Atlantic salmon, twaite shad, three lamprey species – sea lamprey, brook lamprey and river lamprey, the tiny whorl snail (*vertigo moulinsiana)* and otter. This is the only site in the world for the hard-water form of the freshwater pearl mussel, *M. m. durrovensis*, and one of only a handful of spawning grounds in the country for twaite shad. The freshwater stretches of the River Nore main channel is a designated salmonid river. The Barrow/Nore is mainly a grilse fishery though spring salmon fishing is good in the vicinity of Thomastown and Inistioge on the Nore. The upper stretches of the Barrow and Nore, particularly the Owenass River, are very important for spawning (DHLGH 2024b).

1047. The site supports many other important animal species. Those which are listed in the Irish Red Data Book include Daubenton's bat, badger, Irish hare (*Lepus timidus hibernicus*) and common frog. The rare Red Data Book fish species smelt (*Osmerus eperlanus*) occurs in estuarine stretches of the site. In

addition to the freshwater pearl mussel, the site also supports two other freshwater mussel species, *Anodonta anatina* and *A. cygnea*. Three rare invertebrates have been recorded in alluvial woodland at Murphy's of the River. These are: *Neoascia obliqua* (Order Diptera: Syrphidae), *Tetanocera freyi* (Order Diptera: Sciomyzidae) and *Dictya umbrarum* (Order Diptera: Sciomyzidae). The rare invertebrate, *Mitostoma chrysomelas* (Order Arachnida), occurs in the old oak woodland at Abbeyleix and only two other sites in the country. Two flies (Order Diptera) *Chrysogaster virescens* and *Hybomitra muhlfeldi* also occur at this woodland (DHLGH 2024b).

1048. The site is of ornithological importance for a number of Birds Directive Annex I species, including Greenland white-fronted goose, whooper swan, Bewick's swan, bar-tailed godwit, peregrine and kingfisher. Nationally important numbers of golden plover and bar-tailed godwit are found during the winter. Wintering flocks of migratory birds are seen in Shanahoe Marsh and the Curragh and Goul Marsh, both in County Laois, and also along the Barrow Estuary in Waterford Harbour. There is also an extensive autumnal roosting site in the reedbeds of the Barrow Estuary used by swallows (*Hirundo rustica*) before they leave the country. The old oak woodland at Abbeyleix has a typical bird fauna including jay (*Garrulus glandarius*), long-eared owl (*Asio otus*) and raven (*Corvus corax*). The reedbed at Woodstown supports populations of typical waterbirds including mallard, snipe (*Gallinago gallinago*), sedge warbler (*Acrocephalus schoenobaenus*) and water rail (*Rallus aquaticus*) (DHLGH 2024b).

1049. Overall, the site is of considerable conservation significance for the occurrence of good examples of habitats and of populations of plant and animal species that are listed on Annexes I and II of the Habitats Directive. Furthermore, it is of high conservation value for the populations of bird species that use it. The occurrence of several Red Data Book plant species including three rare plants in the salt meadows and the population of the hard-water form of the freshwater pearl mussel, which is limited to a 10km stretch of the Nore, add further interest to this site.

1050. The Proposed Project boundary is located 2.5km north of the River Barrow and River Nore SAC boundary and does not overlap with this European site. The Proposed Project is underlain by deep low/moderate permeability soils and is characterised by short groundwater flow paths. The hydrogeological ZoI of the Proposed Project does not extend to 2.5km and poses no direct risk of hydrogeological effects within the River Barrow and River Nore SAC. However, the Proposed Project does cross watercourses within the Figile River system that drain to the River Barrow and the River Barrow and River Nore SAC more than 12km downstream (refer to Appendix J: Watercourse Crossings and Pathways to European Sites, for more details and EIAR Figure 8.4 to Figure 8.108 for the locations of the watercourse crossings).

7.4.3 Examination and Analysis of Potential Direct and Indirect Impacts

1051. As the Proposed Project does not overlap with the River Barrow and River Nore SAC, none of the qualifying interest habitats or species would be directly impacted. The River Barrow and River Nore SAC (and potential ex-situ sites) also lies beyond the ZoI of any hydrogeological, air quality or disturbance/displacement impacts.

1052. However, in the absence of mitigation measures, the Proposed Project's impacts described in the following sections could potentially affect the conservation objective attributes and targets supporting the conservation condition of the qualifying interests of the River Borrow and River Nore SAC.

7.4.3.1 Construction Phase

7.4.3.1.1 Habitat Degradation as a Result of Excavation and Tunnelling

1053. The only influence tunnelling or excavation works associated with the Proposed Project could have on the River Barrow and River Nore SAC is indirectly during the pipeline installation works at the watercourse crossings, where there is a risk of water quality impacts in the receiving watercourses

regardless of whether open cut or trenchless techniques are used. This is discussed further below in the hydrological impacts section.

7.4.3.1.2 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1054. Hydrostatic pressure testing would be carried out on the Treated Water Pipelines. It is proposed to abstract water from eight water bodies along the route and use the abstracted 'test water' to pressure test the pipeline (Section 5.1.2.2). This water would then be discharged through the use of washouts to land or to water bodies, or tankered away where required. In addition, there are a total of 51 Line Valves along the pipeline route. Two of these are located on the RWRMs and the other 49 are located along the Treated Water Pipeline. The two Line Valves on the RWRMs would not have washouts. Twenty of the 49 Line Valves along the Treated Water Pipeline would have washouts. Washouts at Line Valves would only be used to discharge the sweetening flows during final filling in the Commissioning Phase and the washout design flow would vary between 1l/s and 4l/s. The water used to test the pipeline would be released via one of these 20 Line Valve Washouts. These are detailed in Annex A (Water Body Crossings and Washout Valves – Detailed Assessment) of EIAR Appendix A9.2 (Pipeline Assessment). Such activities in the ZoI of the River Barrow and the River Barrow and River Nore SAC or its tributaries may affect water quality in the European site and has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats hydrologically linked to the European site. Mitigation measures are detailed in Section 7.1.4.3.

1055. As the Proposed Project crosses watercourses that drain to the River Barrow and the River Barrow and River Nore SAC, construction works at these watercourse crossings pose a risk of affecting water quality in the European site through increasing silt-sediment loading, accidental spillage of cement-based products, accidental spillage of hydrocarbons or through faecal contamination arising from on-site toilets and washing facilities.

1056. Affecting water quality in receiving watercourses and in the River Barrow and River Nore SAC has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest aquatic and wetland habitat species associated with the River Barrow.

7.4.3.1.3 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1057. As the Proposed Project would involve instream construction works on watercourses that drain to the Barrow and the River Barrow and River Nore SAC, there is the potential that INNS could be introduced to the surface water network and establish populations downstream in the European site.

1058. Crayfish plague is a contagious fungal-type disease (*Aphanomyces astaci*) which can be spread between catchments on equipment. The crayfish plague, which was transmitted by introduced crayfish species and is caused by the fungus *Aphanomyces astaci*, was first detected in Ireland in the late 1980s. It has since been confirmed in a growing number of inland water bodies across the country. Significant spreading of plague began in 2015 in the River Bruskey/Erne, County Cavan where 600 crayfish were found dead as a result of the disease (DAHG 2015). In 2017, a number of crayfish plague outbreaks were identified around the country. The plague was confirmed in the River Suir between Clonmel and Carrick-on-Suir, County Tipperary in May 2017 (catchment not intersected by the Proposed Project) which caused mass mortality of this native and protected species. The plague was subsequently confirmed in the River Deel, Rathkeale, County Limerick in June 2017 (which flows into the Lower Shannon Estuary), in the Lorrha River, in north County Tipperary in August 2017 (which flows into Lough Derg), and in the River Barrow, at Royal Oak Bridge in Bagenalstown, County Carlow in September 2017 (subcatchment not intersected by the Proposed Project). In 2018, the crayfish plague was found to be widespread in the main channel of the River Barrow stretching as far as Monasterevin (NBDC 2019). Another confirmed case in 2018 was in the River Al, a small 5km tributary which enters the River Shannon at the weir of Golden Island in Athlone, County Westmeath. In 2019, detections of the plague were recorded at the River Clare (County Galway), River Maigue (County Limerick) and the River Nore

(County Kilkenny) (NBDC 2019). Most recently, the crayfish plague was also detected in the Clodiagh (Tullamore) River, near Clonaslee, County Laois in August 2021 (EPA 2021). Given the range and geographic spread of river catchments within which instream works would be carried out during the Construction Phase, in-stream works associated with the watercourse crossings in the Figile River system have the potential to result in the spread or introduction of crayfish plague to the River Barrow and River Nore SAC.

1059. Introducing INNS, or crayfish plague, to the River Barrow and River Nore SAC has the potential to affect the conservation objectives supporting the conservation condition of some of the qualifying interest habitats and the white-clawed crayfish.

7.4.3.1.4 Mortality Risk

1060. As the Proposed Project would involve instream construction works on watercourses linked to the River Barrow and River Nore SAC, there is an increased risk during the Construction Phase of aquatic species (e.g. otter, lamprey species and Atlantic salmon) being killed or injured from collisions with construction traffic/machinery or from construction materials accidentally falling into a water body.

1061. Aquatic species populations in the affected Figile River catchment may be linked to, and may support, the qualifying interest populations in the River Barrow and River Nore SAC. Therefore, an increased mortality risk to aquatic species such as otter, lamprey species and Atlantic salmon has the potential to affect the conservation objectives supporting the conservation condition of aquatic qualifying interest species in the River Barrow and River Nore SAC.

7.4.3.1.5 Barrier Effect

1062. The Figile River catchment would be crossed by the Proposed Project upstream of the River Barrow and River Nore SAC. The pipeline at the stream crossings would be installed using open cut techniques, which would result in a temporary (ranging from one week up to one month in a worst-case scenario) barrier to aquatic species, such as lamprey and Atlantic salmon, movement in that catchment. Such a temporary effect would not result in any significant population level effects, but this is dependent on the affected section of river/stream channel being reinstated to its pre-works condition to maintain the hydrological structure and function and prevent any long-term barrier to fish movement within the catchment.

1063. Presenting a barrier to fish species movement could isolate important habitat that supports a critical life-cycle stage of Atlantic salmon or lamprey species (e.g. spawning grounds). This has the potential to affect the conservation objectives supporting the conservation condition of these species in the River Barrow and River Nore SAC.

7.4.3.2 Operational Phase

7.4.3.2.1 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1064. Although there would not be any routine discharges to the surface water network during the Operational Phase, Washout Valves would be located along the pipeline to facilitate planned repair and maintenance works (every 20-25 years). The water would be dechlorinated before discharge using dechlorination chemicals and there is therefore a risk to water quality in receiving watercourses from accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. Repair and maintenance works may require excavations to repair or replace sections of pipeline which pose a risk of affecting water quality in the surface water network.

1065. Affecting water quality in receiving watercourses and in the River Barrow and River Nore SAC has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest aquatic species and habitats associated with the River Barrow.

7.4.3.2.2 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1066. During the Operational Phase, repair and maintenance works may be required to sections of the pipeline within the Proposed Project, which cross watercourses that drain to the River Barrow and River Nore SAC. There is a risk that plant INNS may colonise lands within the 20m wide Permanent Wayleave post-construction and therefore, a risk that repair and maintenance works could potentially introduce INNS to the surface water network and establish populations downstream in the European site.

1067. Introducing INNS to the River Barrow and River Nore SAC has the potential to affect the conservation objectives supporting the conservation condition of some of the qualifying interest habitats.

7.4.3.3 Summary

1068. Table 7.13 presents a summary of the potential impacts on the qualifying interests of the River Barrow and River Nore SAC as a result of the Proposed Project and how these impacts affect the site's conservation objectives. Those highlighted in blue are the qualifying interests which are present within the ZoI of the Proposed Project that could potentially be impacted.

Table 7.13: Qualifying Interests of the River Barrow and River Nore SAC and Summary of Potential Impacts

Qualifying Interests	Potential Impacts	
	Construction Phase	Operational Phase
Annex I Habitats		
Estuaries [1130]	No potential for impacts	
Mudflats and sandflats not covered by seawater at low tide [1140]	No potential for impacts	
Reefs [1170]	No potential for impacts	
Salicornia and other annuals colonising mud and sand [1310]	No potential for impacts	
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	No potential for impacts	
Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	No potential for impacts	
Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
European dry heaths [4030]	Habitat degradation – INNS	Habitat degradation – INNS
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
* Petrifying springs with tufa formation (*Cratoneurion*) [7220]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS

Qualifying Interests	Potential Impacts	
	Construction Phase	Operational Phase
Annex II Species		
Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016]	Habitat degradation – water quality impacts	Habitat degradation – water quality impacts
Freshwater pearl mussel (*Margaritifera margaritifera*) [1029]	Habitat degradation – water quality impacts	Habitat degradation – water quality impacts
White-clawed crayfish (*Austropotamobius pallipes*) [1092]	Habitat degradation – water quality impacts Habitat degradation – INNS Mortality risk Barrier effect	Habitat degradation – water quality impacts Habitat degradation – INNS
Sea lamprey (*Petromyzon marinus*) [1095]	Habitat degradation – water quality impacts Mortality risk Barrier effect	Habitat degradation – water quality impacts
Brook lamprey (*Lampetra planeri*) [1096]	Habitat degradation – water quality impacts Mortality risk Barrier effect	Habitat degradation – water quality impacts
River lamprey (*Lampetra fluviatilis*) [1099]	Habitat degradation – water quality impacts Mortality risk Barrier effect	Habitat degradation – water quality impacts
Twaite shad (*Alosa fallax*) [1103]	Habitat degradation – water quality impacts	Habitat degradation – water quality impacts
Atlantic salmon (*Salmo salar*) (only in fresh water) [1106]	Habitat degradation – water quality impacts Mortality risk Barrier effect	Habitat degradation – water quality impacts
Otter (*Lutra lutra*) [1355]	Habitat degradation – water quality impacts Mortality risk Barrier effect	Habitat degradation – water quality impacts
Killarney fern (*Trichomanes speciosum*) [1421]	Habitat degradation – INNS	Habitat degradation – INNS

1069. The specific attributes and targets used to define the conservation objectives of the qualifying interest habitats and species of the River Barrow and River Nore SAC are presented in Table 7.14, along with the potential impacts associated with the Proposed Project. Those qualifying interests, and the supporting attributes, measures, and targets at risk of being affected by the Proposed Project are highlighted in blue.

Table 7.14: Potential Impacts on the Conservation Objectives of the River Barrow and River Nore SAC

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Estuaries [1130] **To maintain the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	The permanent habitat area is stable or increasing, subject to natural processes.	No An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the receiving aquatic environment. However, even in a worst-case scenario, if sediments or pollutants were to enter one or more of the watercourses upstream of this SAC during open cut excavation, considering the distance to the estuary (>100km downstream), the temporary nature of such a worst-case scenario, and the assimilative capacity of the River Barrow, no effect on water quality in the estuary would be detectable and therefore there would be no likely significant effect on habitat area, community distribution or community extent in the receiving environment (EIAR Chapter 9: Water). Note: none of the watercourses crossed by the Proposed Project drain to the River Nore.	No	No potential for effects.
Community distribution (hectares)	Conserve the following community types in a natural condition: Muddy estuarine community complex; Sand to muddy fine sand community complex; Fine sand with *Fabulina fabula* community; Sheltered to moderately exposed intertidal reef community complex.			
Community structure: extent (hectares and distribution)	Maintain the natural extent of the *Sabellaria alveolata* reef, subject to natural process.			
Community structure: quality (Honeycomb reef structure)	Conserve the high quality of the *Sabellaria alveolata* reef community, subject to natural processes.			
Mudflats and sandflats not covered by seawater at low tide [1140] **To maintain the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	The permanent habitat area is stable or increasing, subject to natural processes.	No An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the receiving aquatic environment. However, even in a worst-case scenario, if sediments or pollutants were to enter one or more of the watercourses upstream of this SAC during open cut excavation, considering the distance to the estuary (>100km downstream), the temporary nature of such a worst-case scenario, and the assimilative capacity of the River Barrow, no effect on water quality in the estuary would be detectable and therefore there would be no likely significant effect on habitat area and community distribution in the receiving environment (EIAR Chapter 9: Water). Note: none of the watercourses crossed by the Proposed Project drain to the River Nore.	No	No potential for effects.
Community distribution (hectares)	Conserve the following community types in a natural condition: Muddy estuarine community complex; Sand to muddy fine sand community complex.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Reefs [1170] **To maintain the favourable conservation condition of Reefs in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets.**				
Habitat area (hectares)	The permanent area is stable or increasing, subject to natural processes.	No Given the nature of the Proposed Project, no source-pathway-receptor exists, therefore there is no potential for effects.	No	No potential for effects.
Distribution (occurrence)	The distribution of reefs is stable or increasing, subject to natural processes.			
Community extent (hectares)	Conserve the following community type in a natural condition: Sheltered to moderately exposed intertidal reef community complex in a natural condition, subject to natural processes.			
Community structure: extent (hectares and distribution)	Conserve the extent of *Sabellaria alveolata* reef community, subject to natural processes.			
Community structure: quality (Honeycomb reef structure)	Conserve the high quality of the *Sabellaria alveolata* reef community, subject to natural processes.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
***Salicornia* and other annuals colonising mud and sand [1310]** **To maintain the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes, including erosion and succession. For the one sub-site mapped: Ringville - 0.03ha.	No The Proposed Project poses no risk of affecting the hydrological regime supporting the estuarine habitats given it is more than 100km upstream. An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the receiving aquatic environment. However, even in a worst-case scenario, if sediments or pollutants were to enter one or more of the watercourse upstream of this SAC during open cut excavation, considering the distance to the estuary (>100km downstream), the temporary nature of such a worst-case scenario, and the assimilative capacity of the River Barrow, no effect on water quality in the estuary would be detectable and therefore there would be no likely significant effect on habitat, physical structure, vegetation structure or vegetation composition in the receiving environment (EIAR Chapter 9: Water). Note: none of the watercourses crossed by the Proposed Project drain to the River Nore.	No	No potential for effects.
Habitat distribution (occurrence)	No decline, subject to natural processes.			
Physical structure: sediment supply (presence/absence of physical barriers)	Maintain or where necessary restore natural circulation of sediments and organic matter, without any physical obstructions.			
Physical structure: flooding regime (hectares flooded; frequency)	Maintain natural tidal regime.			
Physical structure: creeks and pans (occurrence)	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession.			
Vegetation structure: zonation (occurrence)	Maintain range of saltmarsh habitat zonation including transitional zones, subject to natural processes including erosion and succession.			
Vegetation structure: vegetation height (centimetres)	Maintain structural variation within sward.			
Vegetation structure: vegetation cover (percentage cover at a representative sample of monitoring stops)	Maintain more than 90% of area outside creeks vegetated.			
Vegetation composition: typical species and sub-communities (percentage cover at a representative sample of monitoring stops)	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry & Ryle 2009).			
Vegetation structure: negative indicator species: *Spartina anglica* (hectares)	No significant expansion of *Spartina*. No new sites for this species and an annual spread of less than 1% where it is already known to occur.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] **To restore the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Dunbrody Abbey - 1.25ha, Killowen - 2.59ha, Rochestown - 17.50ha, Ringville - 6.70ha.	No The Proposed Project poses no risk of affecting the hydrological regime supporting the estuarine habitats given it is more than 100km upstream. An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the receiving aquatic environment. However, even in a worst-case scenario, if sediments or pollutants were to enter one or more of the watercourse upstream of this SAC during open cut excavation, considering the distance to the estuary (>100km downstream), the temporary nature of such a worst-case scenario, and the assimilative capacity of the River Barrow, no effect on water quality in the estuary would be detectable and therefore there would be no likely significant effect on habitat, physical structure, vegetation structure or vegetation composition in the receiving environment (EIAR Chapter 9: Water). Note: none of the watercourses crossed by the Proposed Project drain to the River Nore.	No	No potential for effects.
Habitat distribution (occurrence)	No decline or change in habitat distribution, subject to natural processes.			
Physical structure: sediment supply (presence/absence of physical barriers)	Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions.			
Physical structure: flooding regime (hectares flooded; frequency)	Maintain natural tidal regime			
Physical structure: creeks and pans (occurrence)	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession.			
Vegetation structure: zonation (occurrence)	Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.			
Vegetation structure: vegetation height (centimetres)	Maintain structural variation within sward.			
Vegetation structure: vegetation cover (percentage cover at a representative sample of monitoring stops)	Maintain more than 90% area outside creeks vegetated.			
Vegetation composition: typical species and sub-communities (percentage cover at a representative sample of monitoring stops)	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle 2009).			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation structure: negative indicator species - *Spartina anglica* (hectares)	No significant expansion of *Spartina*. No new sites for this species and an annual spread of less than 1% where it is already known to occur.	Cont. - as above	Cont. - as above	Cont. - as above
Mediterranean salt meadows (*Juncetalia maritimi*) [1410] **To restore the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Dunbrody Abbey - 0.08ha, Rochestown - 0.04ha, Ringville - 6.70ha.	No The Proposed Project poses no risk of affecting the hydrological regime supporting the estuarine habitats given it is more than 100km upstream. An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the receiving aquatic environment. However, even in a worst-case scenario, if sediments or pollutants were to enter one or more of the watercourse upstream of this SAC during open cut excavation, considering the distance to the estuary (>100km downstream), the temporary nature of such a worst-case scenario, and the assimilative capacity of the River Barrow, no effect on water quality in the estuary would be detectable and therefore there would be no likely significant effect on habitat, physical structure, vegetation structure or vegetation composition in the receiving environment (EIAR Chapter 9: Water). Note: none of the watercourses crossed by the Proposed Project drain to the River Nore.	No	No potential for effects.
Habitat distribution (occurrence)	No decline, subject to natural processes.			
Physical structure: sediment supply (presence/absence of physical barriers)	Maintain or where necessary restore natural circulation of sediments and organic matter, without any physical obstructions			
Physical structure: creeks and pans (occurrence)	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession.			
Physical structure: flooding regime (hectares flooded; frequency)	Maintain natural tidal regime.			
Vegetation structure: zonation (occurrence)	Maintain range of saltmarsh habitat zonations including transitional zones, subject to natural processes including erosion and succession.			
Vegetation structure: vegetation height (centimetres)	Maintain structural variation within sward.			
Vegetation structure: vegetation cover (percentage cover at a representative sample of monitoring stops)	Maintain more than 90% area outside creeks vegetated.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation composition: typical species and sub-communities (percentage cover at a representative sample of monitoring stops)	Maintain range of sub-communities with typical species listed in SMP (McCorry and Ryle 2009).	Cont. - as above	Cont. - as above	Cont. - as above
Vegetation structure: negative indicator species - *Spartina anglica* (hectares)	No significant expansion of *Spartina*. No new sites for this species and an annual spread of less than 1% where it is already known to occur.			
Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] **To maintain the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Habitat distribution (occurrence)	No decline, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on sensitive aquatic plant species associated with this habitat type (commonly known as floating river vegetation) along the River Barrow. Although unlikely, given the SAC boundary is more than 11.5km from the watercourses crossed by the Proposed Project that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising aquatic habitats along the River Barrow could be spread to floating river vegetation habitat in the SAC via the surface water network. Both impacts could result in habitat loss and affect the distribution of floating river vegetation habitat in the River Barrow and River Nore SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Habitat area (kilometres)	Area stable or increasing, subject to natural processes.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Hydrological regime: river flow (metres per second)	Maintain appropriate hydrological regimes.	No The Figile River catchment would be crossed by the Proposed Project upstream of the River Barrow and River Nore SAC. The pipeline at the stream crossings would be installed using mainly open cut techniques (exception is the Figile_030 which would be crossed on two occasions (WCX056 and WCX057) using trenchless methods; see EIAR Appendix A8.14: Watercourse Crossing Data). Although there is a risk of temporary (ranging from one week up to one month in a worst-case scenario) and insignificant changes to the hydrological regime in those watercourses during the Construction Phase, there is no long-term or permanent risk to the functioning of the hydrological regime along the River Barrow supporting floating river vegetation habitat in the River Barrow and River Nore SAC.	No	No potential for effects.
Hydrological regime: groundwater discharge (metres per second)	The groundwater flow to the habitat should be permanent and sufficient to maintain tufa formation.	No The River Barrow and River Nore SAC lies outside of the hydrogeological ZoI of the Proposed Project and therefore, it cannot affect groundwater flows in the SAC.	No	No potential for effects.
Substratum composition: particle size range (millimetres)	The substratum should be dominated by large particles and free from fine sediments.	Yes The Proposed Project lies upstream of the River Barrow and River Nore SAC. An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the substratum particle size downstream along the River Barrow, particularly where the pollutant is silt/sediment or cement-based materials. It could also potentially negatively affect the water chemistry in receiving watercourses (at least temporarily), depending upon the pollutant involved or potentially negatively affect suspended solid concentrations downstream in the River Barrow, again, particularly where the pollutant is silt/sediment or cement-based materials.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Water chemistry: minerals (milligrammes per litre)	The groundwater and surface water should have sufficient concentrations of minerals to allow deposition and persistence of tufa deposits.			
Water quality: suspended sediment (milligrammes per litre)	The concentration of suspended solids in the water column should be sufficiently low to prevent excessive deposition of fine sediments.			
Water quality: nutrients (milligrammes per litre)	The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition.	No Although the Proposed Project lies upstream of the River Barrow and River Nore SAC, given the nature of the Proposed Project, it poses no risk of affecting nutrient levels in receiving watercourses downstream in the SAC.	No	No potential for effects.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation composition: typical species (occurrence)	Typical species of the relevant habitat sub-type should be present and in good condition.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on sensitive aquatic plant species associated with floating river vegetation habitat along the River Barrow. Although unlikely, given the SAC boundary is more than 11km from the watercourses crossed by the Proposed Project the drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising aquatic habitats along the River Barrow could be spread to floating river vegetation habitat in the SAC via the surface water network. Both impacts could affect the vegetation composition of floating river vegetation habitat in the River Barrow and River Nore SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Floodplain connectivity (area)	The area of active floodplain at and upstream of the habitat should be maintained.	No The Figile River catchment would be crossed by the Proposed Project upstream of the River Barrow and River Nore SAC. The pipeline at the stream crossings would be installed using mainly open cut techniques (exception is the Figile_030 which would be crossed on two occasions (WCX056 and WCX057) using trenchless methods; see EIAR Appendix A8.14: Watercourse Crossing Data) and although there is a risk of temporary (ranging from one week up to one month in a worst-case scenario) and insignificant localised changes to the hydrological regime in those watercourses during the Construction Phase, there is no long-term or permanent risk to the functioning of the hydrological regime or the area of active floodplain along the River Barrow in the River Barrow and River Nore SAC.	No	No potential for effects.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
European dry heaths [4030] **To maintain the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Habitat distribution (occurrence)	No decline from current habitat distribution, subject to natural processes.	Yes Although unlikely, given the SAC boundary is more than 11km from the watercourses crossed by the Proposed Project that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial heathland habitats along the River Barrow valley could be spread to dry heath habitat in the SAC via the surface water network. Introducing INNS could affect the vegetation structure and vegetation composition of dry heath habitat areas.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Habitat area (hectares)	Area stable or increasing, subject to natural processes. Habitat area is not known but estimated as less than 400ha of the area of the SAC, occurring in dispersed locations.			
Physical structure: free-draining, acid, low nutrient soil; rock outcrops (occurrence)	No significant change in soil nutrient status, subject to natural processes. No increase or decrease in area of natural rock outcrop			
Vegetation structure: sub-shrub indicator species (percentage cover)	Cover of characteristic sub-shrub indicator species at least 25%: gorse (*Ulex europaeus*) and where rocky outcrops occur bilberry (*Vaccinium myrtillus*) and woodrush (*Luzula sylvatica*). Some rock outcrops support English stonecrop (*Sedum anglicum*), sheep's bit (*Jasione montana*) and wild madder (*Rubia peregrina*) as well as important moss and lichen assemblages.			
Vegetation structure: senescent gorse (percentage cover)	Cover of senescent gorse less than 50%.			
Vegetation structure: browsing (percentage cover)	Long shoots of bilberry with signs of browsing collectively less than 33%.			
Vegetation structure: native trees and shrubs (percentage cover)	Cover of scattered native trees and shrub less than 20%			
Vegetation composition: positive indicator species (number)	Number of positive indicator species at least two e.g. gorse and associated dry heath/acid grassland flora.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation structure: positive indicator species (percentage cover)	Cover of positive indicator species at least 60%. This should include plant species characteristic of dry heath in this SAC including gorse, bilberry and associated acid grassland flora.	Cont. - as above	Cont. - as above	Cont. - as above
Vegetation composition: bryophyte and non-crustose lichen species (number)	Number of bryophyte or non-crustose lichen species present at least two.			
Vegetation composition: bracken (*Pteridium aquilinum*) (percentage cover)	Cover of bracken less than 10%			
Vegetation structure: weedy negative indicator species (percentage cover)	Cover of agricultural weed species (negative indicator species) less than 1%			
Vegetation composition: non-native species (percentage cover)	Cover of non-native species less than 1%.			
Vegetation composition: rare/scarce heath species (location, area and number)	No decline in distribution or population sizes of rare, threatened or scarce species, including greater broomrape (*Orobanche rapum-genistae*) and the legally protected clustered clover (*Trifolium glomeratum*).			
Vegetation structure: disturbed bare ground (percentage cover)	Cover of disturbed bare ground less than 10% (but if peat soil less than 5%).	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to the River Barrow and River Nore SAC. Dry heath habitat in the River Barrow and River Nore SAC is associated with the steep valley sides of the rivers especially in the Barrow Valley and along the Barrow tributaries where they occur in the foothills of the Blackstairs Mountains. As dry heath is a terrestrial habitat with no intrinsic dependence on surface water interactions to support the vegetation composition or structure, any potential water quality impacts associated with the Proposed Project pose no risk of affecting any of these attributes and targets supporting the favourable conservation status of dry heath habitat in the River Barrow and River Nore SAC. Thus, there is no potential for adverse effects on the integrity of the site.	No	No potential for effects.
Vegetation structure: burning (occurrence)	No signs of burning within sensitive areas.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] **To maintain the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Habitat distribution (occurrence)	No decline, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on sensitive plant species associated with fringing aquatic vegetation along the banks of the River Barrow. Although unlikely, given the SAC boundary is more than 11km from the watercourses crossed by the Proposed Project that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising fringing aquatic vegetation along the River Barrow could be spread to tall-herb fringe habitat in the SAC via the surface water network. Note: none of the watercourses crossed by the Proposed Project drain to the River Nore. Both impacts could result in habitat loss and affect the distribution of tall-herb fringe habitat in the River Barrow and River Nore SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Habitat area (hectares)	Area stable or increasing, subject to natural processes.			
Hydrological regime: Flooding depth/height of water table (metres)	Maintain appropriate hydrological regimes.	No The Figile River catchment would be crossed by the Proposed Project upstream of the River Barrow and River Nore SAC. The pipeline at the stream crossings would be installed using mainly open cut techniques (exception is the Figile_030 which would be crossed on two occasions (WCX056 and WCX057) using trenchless methods; see EIAR Appendix A8.14: Watercourse Crossing Data). Although there is a risk of temporary (ranging from one week up to one month in a worst-case scenario) and insignificant changes to the hydrological regime in those watercourses during the Construction Phase, there is no long-term or permanent risk to the functioning of the hydrological regime along the River Barrow supporting fringing aquatic vegetation in the River Barrow and River Nore SAC.	No	No potential for effects.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation structure: sward height (centimetres)	30-70% of sward is between 40 and 150cm in height.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on sensitive plant species associated with fringing aquatic vegetation along the banks of the River Barrow. Although unlikely, given the SAC boundary is more than 11km from the watercourses crossed by the Proposed Project that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising fringing aquatic vegetation along the River Barrow could be spread to tall-herb fringe habitat in the SAC via the surface water network. Introducing plant INNS could negatively affect the sward height and the broadleaved herb component of the vegetation, and the abundance of positive indicator species.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Barrow and River Nore SAC Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: broadleaved herb: grass ratio (percentage)	Broadleaved herb component of vegetation between 40 and 90%.			
Vegetation composition: typical species (number)	At least five positive indicator species present.			No potential for effects, following the implementation of mitigation measures.
Vegetation composition: negative indicator species (occurrence)	Negative indicator species, particularly invasive non-native species, absent or under control – NB Indian balsam (*Impatiens glandulifera*), monkeyflower (*Mimulus guttatus*), Japanese knotweed (*Reynoutria japonica*) and giant hogweed (*Heracleum mantegazzianum*).	Yes Although unlikely, given the SAC boundary is more than 11km from the watercourses crossed by the Proposed Project that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising fringing aquatic vegetation along the River Barrow could be spread to tall-herb fringe habitat in the SAC via the surface water network.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
*** Petrifying springs with tufa formation (*Cratoneurion*) [7220]** **To maintain the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Habitat area (square metres)	Area stable or increasing, subject to natural processes.	No Petrifying springs develop as a result of hydrogeological processes. The River Barrow and River Nore SAC lies outside of the hydrogeological ZoI of the Proposed Project, which therefore cannot affect the functioning or extent of the spring sites (i.e. affect the quality or quantity of groundwater flows and tufa deposition that support the associated vegetation community) or the area covered by petrifying spring habitat in the SAC.	No	No potential for effects.
Habitat distribution (occurrence)	No decline.			
Hydrological regime: height of water table; water flow (metres; metres per second)	Maintain appropriate hydrological regimes.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Water quality (water chemistry measures)	Maintain oligotrophic and calcareous conditions.	Yes Characteristically, petrifying spring water has high values for pH, alkalinity and dissolved calcium and is oligotrophic (nutrient poor). Although the Proposed Project lies upstream of the River Barrow and River Nore SAC, given the nature of the Proposed Project, it poses no risk of affecting nutrient levels in receiving watercourses downstream. However, an accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water chemistry in receiving watercourses (at least temporarily), depending upon the pollutant involved.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on aquatic or wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: typical species (occurrence)	Maintain typical species.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on sensitive plant species associated with petrifying spring sites (at least locally) where the springs have a direct interaction with the River Barrow. Although unlikely, given the SAC boundary is more than 11km from the watercourses crossed by the Proposed Project that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via the surface water network, to petrifying springs along the River Barrow in the SAC. Both of these potential impacts could affect the composition of the vegetation communities associated with any petrifying spring sites.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on aquatic or wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] **To restore the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes, at least 85.08ha for sub-sites surveyed.	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to old oak woodland habitat within the River Barrow and River Nore SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of affecting the woodland area (see also woodland regeneration below in terms of potential long-term effects of introducing INNS to woodland habitats).	No	No potential for effects.
Habitat distribution (occurrence)	No decline.			
Woodland size (hectares)	Area stable or increasing. Where topographically possible, 'large' woods at least 25ha in size and 'small' woods at least 3ha in size.			
Woodland structure: cover and height (percentage and metres)	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer.	Yes Although unlikely, given the SAC boundary is more than 11km from the watercourses crossed by the Proposed Project that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial woodland habitats could be spread, via the surface water network, to parts of the old oak woods along the River Barrow in the SAC. Introducing plant INNS could affect the structure of the woodland community, most likely through plant INNS outcompeting and overgrowing the shrub and herb layers in the woodland.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Woodland structure: community diversity and extent (hectares)	Maintain diversity and extent of community types.	Yes Although unlikely, given the SAC boundary is more than 11km from the watercourses crossed by the Proposed Project that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial woodland habitats could be spread, via the surface water network, to parts of the old oak woods along the River Barrow in the SAC. An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on sensitive woodland plant species (at least locally) where the habitat has a direct interaction with the River Barrow through seasonal flooding. Both of these potential impacts could affect the diversity of the woodland community.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Barrow and River Nore SAC (Section 7.4.4). Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Woodland structure: natural regeneration (seedling: sapling: pole ratio)	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Yes Although unlikely, given the SAC boundary is more than 11km from the watercourses crossed by the Proposed Project that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial woodland habitats could be spread, via the surface water network, to parts of the old oak woods along the River Barrow in the SAC. Introducing plant INNS could affect the natural regeneration of woodland flora, most likely through plant INNS outcompeting and overgrowing the shrub and herb layers in the woodland.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Woodland structure: dead wood (m^3 per hectare; number per hectare)	At least 30m^3/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter.	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to old oak woodland habitat within the River Barrow and River Nore SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of affecting the abundance of dead wood or veteran trees, or affecting the woodland structure or vegetation composition of the old oak woodlands.	No	No potential for effects.
Woodland structure: veteran trees (number per hectare)	No decline.			
Woodland structure: indicators of local distinctiveness (occurrence)	No decline.			
Vegetation composition: native tree cover (percentage)	No decline. Native tree cover not less than 95%			
Vegetation composition: typical species (occurrence)	A variety of typical native species present, depending on woodland type, including oak (*Quercus petraea*) and birch (*Betula pubescens*)			
Vegetation composition: negative indicator species (occurrence)	Negative indicator species, particularly non-native invasive species, absent or under control			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
*** Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]** **To restore the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes, at least 181.54ha for sites surveyed.	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to alluvial woodland habitat within the River Barrow and River Nore SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of affecting the woodland area, the distribution of alluvial woodlands, or the size of alluvial woodlands in the SAC (see also woodland regeneration below in terms of potential long-term effects of introducing INNS to woodland habitats).	No	No potential for effects.
Habitat distribution (occurrence)	No decline.			
Woodland size (hectares)	Area stable or increasing. Where topographically possible, 'large' woods at least 25ha in size and 'small' woods at least 3ha in size.			
Vegetation composition: negative indicator species (occurrence)	Negative indicator species, particularly non-native invasive species, absent or under control			
Woodland structure: cover and height (percentage and metres)	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer.	Yes Although unlikely, given the SAC boundary is more than 11km from the watercourses crossed by the Proposed Project that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising alluvial woodland habitats along the shores of the River Barrow could be spread to alluvial forest habitat in the SAC via the surface water network. Introducing plant INNS could negatively affect the number, abundance and diversity of native woodland species. Introducing plant INNS could affect the structure of the woodland community, most likely through plant INNS outcompeting and overgrowing the shrub and herb layers in the woodland.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Woodland structure: community diversity and extent (hectares)	Maintain diversity and extent of community types.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on sensitive woodland plant species where the habitat has a direct interaction with woodlands on the banks of the River Barrow through seasonal flooding (some of which may be considered locally distinctive). Although unlikely, given the SAC boundary is more than 11km from the watercourses crossed by the Proposed Project that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising alluvial woodland habitats along the River Barrow could be spread to alluvial forest habitat in the SAC via the surface water network. Introducing plant INNS could negatively affect the number, abundance and diversity of any locally distinctive species. Both of these potential impacts could affect the diversity of the woodland community.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Woodland structure: natural regeneration (seedling:sapling:pole ratio)	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Yes Although unlikely, given the SAC boundary is more than 11km from the watercourses crossed by the Proposed Project that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising alluvial woodland habitats along the River Barrow could be spread to alluvial forest habitat in the SAC via the surface water network. Introducing plant INNS could affect the natural regeneration of woodland flora, most likely through plant INNS outcompeting and overgrowing the shrub and herb layers in the woodland.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Barrow and River Nore SAC (Section 7.4.4)	No potential for effects, following the implementation of mitigation measures.
Hydrological regime: flooding depth/height of water table (metres)	Appropriate hydrological regime necessary for maintenance of alluvial vegetation.	No The Figile River catchment would be crossed by the Proposed Project upstream of the River Barrow and River Nore SAC. The pipeline at the stream crossings would be installed using mainly open cut techniques (exception is the Figile_030 which would be crossed on two occasions (WCX056 and WCX057) using trenchless methods; see EIAR Appendix A8.14: Watercourse Crossing Data) Although there is a risk of temporary (ranging from one week up to one month in a worst-case scenario) and insignificant changes to the hydrological regime in those watercourses during the Construction Phase, there is no significant long-term or permanent risk to the functioning of the hydrological regime along the River Barrow supporting alluvial woodland habitat in the River Barrow and River Nore SAC.	No	No potential for effects.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Woodland structure: dead wood (m^3 per hectare; number per hectare)	At least $30m^3$/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder (*Alnus glutinosa*)).	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to alluvial woodland habitat within the River Barrow and River Nore SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of affecting the abundance of dead wood or the numbers/abundance of woodland tree species in the alluvial woodlands.	No	No potential for effects.
Woodland structure: veteran trees (number per hectare)	No decline.			
Woodland structure: indicators of local distinctiveness (occurrence)	No decline.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on sensitive woodland plant species where the habitat has a direct interaction with the River Barrow through seasonal flooding (some of which may be considered locally distinctive). Although unlikely, given the SAC boundary is more than 11km from the watercourses crossed by the Proposed Project that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial woodland habitats along the River Barrow could be spread to alluvial forest habitat in the SAC via the surface water network. Introducing plant INNS could negatively affect the number, abundance and diversity of any locally distinctive species.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: native tree cover (percentage)	No decline. Native tree cover not less than 95%.	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to alluvial forest habitat within the River Barrow and River Nore SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of affecting the numbers/ abundance/ composition of woodland tree species.	No	No potential for effects.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation composition: typical species (occurrence)	A variety of typical native species present, depending on woodland type, including ash (*Fraxinus excelsior*) alder (*Alnus glutinosa*), willows (Salix spp.) and locally, oak (*Quercus robur*)	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on sensitive native woodland plant species where the habitat has a direct interaction with the River Barrow through seasonal flooding. Although unlikely, given the SAC boundary is more than 11km from the watercourses crossed by the Proposed Project that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial woodland habitats along the River Barrow could be spread to alluvial forest habitat in the SAC via the surface water network. Introducing plant INNS could negatively affect the number, abundance and diversity of native woodland species.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016] **To maintain the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Distribution: occupied sites (number)	No decline. Two known sites: Borris Bridge, Co. Carlow S711503; Boston Bridge, Kilnaseer S338774, Co. Laois.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on wetland habitats supporting *Vertigo moulinsiana* in the River Barrow and River Nore SAC such that individuals are killed and/or the affected habitat becomes unsuitable for occupation (at least temporarily). This could affect the number of occupied sites in the SAC, the number of adult snails present in affected areas, or the distribution of adult snails, area of suitable habitat, or the condition and quality of suitable habitat across the site.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Population size: adults (number per positive sample)	E.g. at least five adult snails in at least 50% of samples.			
Population density (percentage positive samples)	E.g. adult snails present in at least 60% of samples per site.			
Area of occupancy (hectares)	E.g. minimum of 1ha of suitable habitat per site.			
Habitat quality: vegetation (percentage of samples with suitable vegetation)	E.g. 90% of samples in habitat classes I and II as defined in Moorkens & Killeen (2011).			
Habitat quality: soil moisture levels (percentage of samples with appropriate soil moisture levels)	E.g. 90% of samples in moisture class 3-4 as defined in Moorkens & Killeen (2011).	No The watercourses crossed by the Proposed Project that drain to this SAC are more than 20km upstream from the boundary of the SAC and pose no risk of affecting soil moisture levels in the River Barrow and River Nore SAC.	No	No potential for effects.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Freshwater pearl mussel (*Margaritifera margaritifera*) [1029] **The status of the freshwater pearl mussel (*Margaritifera margaritifera*) as a qualifying Annex II species for the River Barrow and River Nore SAC is currently under review. The outcome of this review will determine whether a site-specific conservation objective is set for this species.**				
Distribution: Ballymurphy (kilometres)	Restore distribution at 3.91km.	Yes The River Barrow and River Nore SAC is downstream of watercourse crossings in the Figile River system (Appendix J: Watercourse Crossings and Pathways to European Sites). An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could have significant negative effects on the quality, extent and availability of freshwater pearl mussel habitat present downstream of the Proposed Project in the SAC. Impacts on freshwater pearl mussel habitat through water quality impacts could result in further deterioration of habitat quality and/or prolong the effects of existing/ongoing habitat degradation, in combination with other sources. Habitat degradation can affect juvenile recruitment, result in stress and mortality of adult mussels, and affect the species distribution, population size and population structure long-term.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on the aquatic environment of the River Barrow and River Nore SAC are avoided (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Distribution: Mountain (kilometres)	Restore distribution at 9.45km.			
Distribution: Nore (kilometres)	Restore distribution at 21.13km.			
Population size: Ballymurphy (number of adult mussels)	Restore Ballymurphy population to at least 1,000 adult mussels			
Population size: Mountain (number of adult mussels)	Restore Mountain population to at least 4,000 adult mussels			
Population size: Nore (number of adult mussels)	Restore Nore population to at least 5,000 adult mussels			
Population structure: recruitment (percentage per size class)	Restore to at least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length			
Population structure: adult mortality. Ballymurphy (percentage)	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution			
Population structure: adult mortality. Mountain (percentage)	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution			
Population structure: adult mortality. Nore (percentage)	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution			
Suitable habitat: extent (kilometres)	Restore suitable habitat in more than 3.91km in the Ballymurphy, 5.3km in the Mountain and 16.72km in the Nore system (see map 8) and any additional stretches necessary for salmonid spawning			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Suitable habitat: condition (kilometres)	Restore condition of suitable habitat	Cont. - as above	Cont. - as above	Cont. - as above
Water quality: macroinvertebrates and phytobenthos (diatoms) (Ecological Quality Ratio [EQR])	Maintain or restore water quality. Macroinvertebrates: EQR greater than 0.90 (Q4-5 or Q5). Phytobenthos: EQR greater than 0.93.			
Substratum quality: filamentous algae (macroalgae), macrophytes (rooted higher plants (percentage)	Maintain or restore substratum quality - trace (<5%); macrophytes: absent or trace (<5%).			
Substratum quality: sediment (occurrence)	Restore substratum quality- stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment			
Substratum quality: oxygen availability (redox potential)	Restore to no more than 20% decline from water column to 5cm depth in substrate			
Fringing habitat: area and condition (hectares)	Maintain or restore the area and condition of fringing habitats necessary to support the population.			
Hydrological regime: flow variability (metres per second)	Restore appropriate hydrological regime			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Host fish (number)	Maintain sufficient juvenile salmonids to host glochidial larvae.	As assessed below under Atlantic salmon, the Proposed Project also has the potential to affect salmonid fish numbers in the River Barrow system. Note: none of the watercourses crossed by the Proposed Project drain to the River Nore.	Yes Measures to reinstate the river channel to its pre-works condition and hydrological structure and function, would be implemented to ensure that the Proposed Project would not present a barrier to fish movement within the Figile River catchment and any related effects on aquatic qualifying interest species of the River Barrow and River Nore SAC are avoided (Section 7.4.4). Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on the aquatic environment of the River Barrow and River Nore SAC are avoided (Section 7.4.4). Measures would be implemented to ensure that construction works in, or in the ZoI of watercourses, do not result in the mortality of any aquatic qualifying interest species of the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
White-clawed crayfish (*Austropotamobius pallipes*) [1092] **To maintain the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Distribution (occurrence)	No reduction from baseline.	Yes The Figile River catchment would be crossed by the Proposed Project upstream of the River Barrow and River Nore SAC. The pipeline at the stream crossings would be installed using mainly open cut techniques (exception is the Figile_030 which would be crossed on two occasions (WCX056 and WCX057) using trenchless methods; see EIAR Appendix A8.14: Watercourse Crossing Data) which would result in a temporary (ranging from one week up to one month in a worst-case scenario) and potentially adverse barrier effect to crayfish movement in that catchment. If not reinstated to the pre-works condition there is the potential for a long-term barrier which could have adverse effects on crayfish movement in the affected catchment. An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could have significant negative effects on the quality, extent and availability of white-clawed crayfish habitat present downstream of the Proposed Project in the SAC and affect the species distribution, or could impact water quality in receiving watercourses and could potentially result in crayfish mortality through contaminant/toxin poisoning (see also disease occurrence below).	Yes Measures to reinstate the river channel to its pre-works condition and hydrological structure and function, would be implemented to ensure that the Proposed Project would not present a barrier to crayfish movement within the Figile River catchment and any related effects on aquatic qualifying interest species of the River Barrow and River Nore SAC are avoided (Section 7.4.4). Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Population structure: recruitment (percentage occurrence of juveniles and females with eggs)	Juveniles and/or females with eggs in at least 50% of positive samples.			
Negative indicator species (occurrence)	No alien crayfish species.	Yes Alien or non-native crayfish species are identified as major direct threat to this species and as disease vector for crayfish plague. Although there are no confirmed populations of non-native crayfish in the wild at present, there is the potential that an accidental introduction may occur in river systems crossed by the Proposed Project by the time construction works commence.	Yes Strict biosecurity protocols would be implemented to ensure that crayfish plague is not introduced to the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Disease (occurrence)	No instances of disease.	Yes Crayfish plague is a contagious fungal-type disease (*Aphanomyces astaci*) which can be spread between catchments on equipment. There are currently five outbreaks in Ireland affecting the Bruskey/Erne rivers, the lower River Suir, the River Deel, the River Barrow and the Lorrha. Given the range and geographic spread of river catchments within which instream works would be carried out during the Construction Phase, in-stream works associated with the watercourse crossings in the Figile River system have the potential to result in the spread or introduction of crayfish plague to the River Barrow and River Nore SAC. Introducing crayfish plague to the River Barrow system could have long-term effects on the species distribution and population structure in the River Barrow and River Nore SAC.	Yes Strict biosecurity protocols would be implemented to ensure that crayfish plague is not introduced to the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Water quality (EPA Q value)	At least Q3-4 at all sites sampled by EPA.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could have significant negative impacts on water quality in receiving watercourses or could influence the quality, extent and availability of white-clawed crayfish habitat present downstream of the Proposed Project in the SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on the aquatic environment of the River Barrow and River Nore SAC are avoided (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Habitat quality: heterogeneity (occurrence of positive habitat features)	No decline in heterogeneity or habitat quality.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Sea lamprey (*Petromyzon marinus*) [1095] **To restore the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Distribution: extent of anadromy (% of river accessible)	Greater than 75% of main stem length of rivers accessible from estuary.	The Proposed Project crosses watercourses in the upper Figile River sub-catchment, which itself is outside of the SAC. These watercourse crossings are in the upper reaches of the catchment and significantly more than 75% of the length of the River Barrow from the estuary. Therefore, the Proposed Project cannot affect the restoration of the target of, greater than 75% of main stem length of rivers accessible from estuary.	No	No potential for effects.
Population structure of juveniles (number of age/size groups)	At least three age/size groups present.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could have significant negative effects on the quality, extent and availability of any juvenile lamprey habitat present downstream of the Proposed Project which in turn could affect the population structure of the juvenile lamprey population or the density of juvenile lamprey present.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Juvenile density in fine sediment (juveniles/m²)	Juvenile density at least 1/m².			
Extent and distribution of spawning habitat (m² and occurrence)	No decline in extent and distribution of spawning beds.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could have significant negative impacts on lamprey spawning habitat downstream through silt smothering sand/gravel beds. Such impacts could affect the extent and distribution of spawning grounds. Lamprey habitat potential was recorded upstream of this SAC at watercourse crossings WCX049, WCX054, WCX056, WCX057 WCX058, WCX059, WCX079 and WCX085 (Appendix J: Watercourse Crossings and Pathways to European Sites).	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Availability of juvenile habitat (number of positive sites in 3rd order channels (and greater), downstream of spawning areas)	More than 50% of sample sites positive.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could have significant negative effects on the quality, extent and availability of any juvenile lamprey habitat present downstream of the Proposed Project. Juvenile lamprey habitat potential was recorded upstream of this SAC at watercourse crossings WCX049, WCX054, WCX056, WCX057 WCX058, WCX059, WCX079 and WCX085 (Appendix J: Watercourse Crossings and Pathways to European Sites).	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Mortality risk posed by construction works	Not defined in any existing conservation objectives document.	Yes The mortality risk posed to lamprey by construction works is related to both direct mortality, due to potential interaction with construction machinery/vehicles (especially the risk of injury when over pumping/ fluming instream works areas), and/or indirect mortality, due to an accidental pollution event resulting in mortality through contaminant/toxin poisoning. Although the SAC boundary is more than 11km from the watercourses crossed by the Proposed Project that drain to this SAC, there is the potential that the qualifying interest lamprey population of the River Barrow and River Nore SAC use watercourses, and rely on habitat, within the Figile River sub-catchment.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4). Measures would be implemented to ensure that construction works in, or in the ZoI of watercourses, do not result in the mortality of any aquatic qualifying interest species of the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Brook Lamprey (*Lampetra planeri*) [1096] **To restore the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Distribution (% of river accessible)	Access to all watercourses down to first order streams.	Yes The Figile River catchment would be crossed by the Proposed Project upstream of the River Barrow and River Nore SAC. The pipeline at the stream crossings would be installed using mainly open cut techniques (exception is the Figile_030 which would be crossed on two occasions (WCX056 and WCX057) using trenchless methods; see EIAR Appendix A8.14: Watercourse Crossing Data) which would result in a temporary (ranging from one week up to one month in a worst-case scenario) and potentially adverse barrier effect to fish movement in that catchment. If not reinstated to the pre-works condition there is the potential for a long-term barrier which could have adverse effects on lamprey movement in the affected catchment.	Yes Measures to reinstate the river channel to its pre-works condition and hydrological structure and function, would be implemented to ensure that the Proposed Project would not present a barrier to fish movement within the Figile River catchment and any related effects on aquatic qualifying interest species of the River Barrow and River Nore SAC are avoided (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Population structure of juveniles (number of age/size groups)	At least three age/size groups of brook/river lamprey present.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could have significant negative effects on the quality, extent and availability of any juvenile lamprey habitat present downstream of the Proposed Project which in turn could affect the population structure of the juvenile lamprey population, the density of juvenile lamprey present, or could impact lamprey spawning habitat downstream through silt smothering of sand/gravel beds. Such impacts could affect the extent and distribution of spawning grounds. Lamprey habitat potential was recorded upstream of this SAC at watercourse crossings WCX049, WCX054, WCX056, WCX057 WCX058, WCX059, WCX079 and WCX085 (Appendix J: Watercourse Crossings and Pathways to European Sites).	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Juvenile density in fine sediment (juveniles/m²)	Mean catchment juvenile density of brook/river lamprey at least 2/m².			
Extent and distribution of spawning habitat (m² and occurrence)	No decline in extent and distribution of spawning beds.			
Availability of juvenile habitat (number of positive sites in second order channels (and greater), downstream of spawning areas)	More than 50% of sample sites positive.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could have significant negative effects on the quality, extent and availability of any juvenile lamprey habitat present downstream of the Proposed Project.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Mortality risk posed by construction works	Not defined in any existing conservation objectives document	Yes The mortality risk posed to lamprey by construction works is related to both direct mortality, due to potential interaction with construction machinery/vehicles (especially the risk of injury when over pumping/ fluming instream works areas), and/or indirect mortality, due to an accidental pollution event resulting in mortality through contaminant/ toxin poisoning. Although the SAC boundary is more than 11km from the watercourses crossed by the Proposed Project that drain to this SAC, there is the potential that the qualifying interest lamprey population of the River Barrow and River Nore SAC use watercourses, and rely on habitat, within the Figile River sub-catchment.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4). Measures would be implemented to ensure that construction works in, or in the ZoI of watercourses, do not result in the mortality of any aquatic qualifying interest species of the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
River Lamprey (*Lampetra fluviatilis*) [1099] **To restore the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Distribution: extent of anadromy (percentage of river accessible)	Greater than 75% of main stem and major tributaries down to second order accessible from estuary.	The Proposed Project crosses watercourses in the upper Figile River sub-catchment, which itself is outside of the SAC. These watercourse crossings are in the upper reaches of the catchment and significantly more than 75% of the length of the River Barrow from the estuary. Therefore, the Proposed Project cannot affect the restoration of the target of '*Greater than 75% of main stem length of rivers accessible from estuary*'.	No	No potential for effects.
Population structure of juveniles (number of age/size groups)	At least three age/size groups of brook/river lamprey present.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could have significant negative effects on the quality, extent and availability of any juvenile lamprey habitat present downstream of the Proposed Project which in turn could affect the population structure of the juvenile lamprey population and affect the density of juvenile lamprey present. It could also impact lamprey spawning habitat downstream through silt smothering sand/gravel beds. Such impacts could affect the extent and distribution of spawning grounds. Lamprey habitat potential was recorded upstream of this SAC at watercourse crossings WCX049, WCX054, WCX056, WCX057 WCX058, WCX059, WCX079 and WCX085 (Appendix J: Watercourse Crossings and Pathways to European Sites).	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Juvenile density in fine sediment (juveniles/m²)	Mean catchment juvenile density of brook/river lamprey at least 2/m².			
Extent and distribution of spawning habitat (m² and occurrence)	No decline in extent and distribution of spawning beds.			
Availability of juvenile habitat (number of positive sites in second order channels (and greater) downstream of spawning areas)	More than 50% of sample sites positive.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could have significant negative effects on the quality, extent and availability of any juvenile lamprey habitat present downstream of the Proposed Project. Juvenile lamprey habitat potential was recorded upstream of this SAC at watercourse crossings WCX049, WCX054, WCX056, WCX057 WCX058, WCX059, WCX079 and WCX085 (Appendix J: Watercourse Crossings and Pathways to European Sites).	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Mortality risk posed by construction works	Not defined in any existing conservation objectives document.	Yes The mortality risk posed to lamprey by construction works is related to both direct mortality, due to potential interaction with construction machinery/vehicles (especially the risk of injury when over pumping/ fluming instream works areas), and/or indirect mortality, due to an accidental pollution event resulting in mortality through contaminant/ toxin poisoning. Although the SAC boundary is more than 11km from the watercourses crossed by the Proposed Project that drain to this SAC, there is the potential that the qualifying interest lamprey population of the River Barrow and River Nore SAC use watercourses, and rely on habitat, within the Figile River sub-catchment.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4). Measures would be implemented to ensure that construction works in, or in the ZoI of watercourses, do not result in the mortality of any aquatic qualifying interest species of the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Twaite shad (*Alosa fallax*) [1103] **To restore the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Distribution: extent of anadromy (% of river accessible)	Greater than 75% of main stem length of rivers accessible from estuary.	No The current distribution of the twaite shad extends only as far as St. Mullins in the River Barrow catchment as the existing weir currently acts as a barrier (King & Linnane 2004). The Proposed Project will not result in any instream works or the creation of any new barriers within this area. Although the Proposed Project crosses watercourses in the upper Figile River sub-catchment, which itself is outside of the SAC, these watercourse crossings are more than 75% of the length of the River Barrow from the estuary. Therefore, the Proposed Project cannot affect the restoration of the target of '*Greater than 75% of main stem length of rivers accessible from estuary*'.	No	No potential for effects.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Population structure: age classes (number of age classes)	More than one age class present.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could have significant negative impacts on fish through silt smothering spawning grounds or affecting respiration, chemical contaminants physically damaging fish or causing mortality as a result of toxins. Such impacts could result in a reduction in fish numbers, at least temporarily, with an increased risk of a population level effect if a pollution event were to occur in conjunction with fish migrating upstream from the sea to spawning grounds. Even in a worst-case scenario, considering the distance (>100km downstream to St. Mullins) and assimilative capacity of the River Barrow, the effect on water quality in the lower reaches of the River Barrow catchment of an accidental pollution event in the Figile River system would not be detectable (EIAR Chapter 9: Water) and therefore would not have any effect on salmonid fish populations. However, again considering the 'restore' conservation objective, there is the potential that at some point in the future, twaite shad may use spawning grounds much closer to the Proposed Project. In that scenario there is the potential that the twaite shad population and the supporting habitat may be impacted by an accidental pollution event to a degree that the conservation objectives would be affected.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on the aquatic environment of the River Barrow and River Nore SAC are avoided (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Extent and distribution of spawning habitat (m² and occurrence)	No decline in extent and distribution of spawning habitats.			
Spawning habitat quality: Filamentous algae; macrophytes; sediment (occurrence)	Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth.			
Water quality: oxygen levels (milligrams per litre)	No lower than 5mg/l.	No The Proposed Project poses no risk of affecting dissolved oxygen levels in receiving watercourses.	No	No potential for effects.
Atlantic salmon (*Salmo salar*) (only in fresh water) [1106] **To restore the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Distribution: extent of anadromy (percentage of river accessible)	100% of river channels down to second order accessible from estuary.	Yes The Figile River catchment would be crossed by the Proposed Project upstream of the River Barrow and River Nore SAC. The pipeline at the stream crossings would be installed using mainly open cut techniques (exception is the Figile_030 which would be crossed on two occasions (WCX056 and WCX057) using trenchless methods; see EIAR Appendix A8.14: Watercourse Crossing Data) which would result in a temporary (ranging from one week up to one month in a worst-case scenario) and potentially adverse barrier effect to fish movement in that catchment. If not reinstated to the pre-works condition, there is the potential for a long-term barrier which could have adverse effects on aquatic species movement in the affected catchment.	Yes Measures to reinstate the river channel to its pre-works condition and hydrological structure and function, would be implemented to ensure that the Proposed Project would not present a barrier to fish movement within the Figile River catchment and any related effects on aquatic qualifying interest species of the River Barrow and River Nore SAC are avoided (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Adult spawning fish (number)	Conservation Limit (CL) for each system consistently exceeded.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could have significant negative impacts on fish through silt smothering spawning grounds or affecting respiration, chemical contaminants physically damaging fish or causing mortality as a result of toxins. Such impacts could result in a reduction in fish numbers, at least temporarily, with an increased risk of a population level effect if a pollution event were to occur in conjunction with fish migrating upstream from the sea to spawning grounds. Such impacts could also result in a reduction in salmon fry abundance downstream or a reduction in fish numbers, at least temporarily, with an increased risk of a population level effect if a pollution event were to occur in conjunction with fish migrating downstream to the sea or could have negative effects on redd counts through silt smothering spawning grounds downstream. Salmonid habitat potential and spawning habitat was recorded upstream of this SAC at watercourse crossings WBX078, WCX048, WCX049, WCX054, WCX056, WCX057, WCX058, WCX059, WCX060, WCX079, WCX082, WCX083 and WCX085 (Appendix J: Watercourse Crossings and Pathways to European Sites).	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on the aquatic environment of the River Barrow and River Nore SAC are avoided (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Salmon fry abundance: (number of fry/five minutes electrofishing)	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/ five minutes sampling.			
Out-migrating smolt abundance (number)	No significant decline.			
Number and distribution of redds (number and occurrence)	No decline in number and distribution of spawning redds due to anthropogenic causes.			
Water quality (EPA Q value)	At least Q4 at all sites sampled by EPA.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could have significant negative impacts on water quality in receiving watercourses.		

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Mortality risk posed by construction works	Not defined in any existing conservation objectives document.	Yes The mortality risk posed to Atlantic salmon by construction works is related to both direct mortality, due to potential interaction with construction machinery/vehicles (especially the risk of injury when over pumping/fluming instream works areas), and/or indirect mortality, due to an accidental pollution event resulting in mortality through contaminant/toxin poisoning. Although the SAC boundary is more than 11km from the watercourses crossed by the Proposed Project that drain to this SAC, there is the potential that the qualifying interest Atlantic salmon population of the River Barrow and River Nore SAC use watercourses, or rely on habitat, within the Figile River sub-catchment.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on the aquatic environment of the River Barrow and River Nore SAC are avoided (Section 7.4.4). Measures would be implemented to ensure that construction works in, or in the ZoI of watercourses, do not result in the mortality of any aquatic qualifying interest species of the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Otter (*Lutra lutra*) [1355] **To restore the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Distribution (percentage positive survey sites)	No significant decline.	No As the watercourses crossed by the Proposed Project that drain to this SAC are more than 20km upstream from the boundary of the SAC, it poses no risk of disturbing or displacing otter from habitat areas used within the SAC during the Construction Phase or the Operational Phase.	No	No potential for effects.
Extent of terrestrial habitat (hectares)	No significant decline. Area mapped and calculated as 122.8ha above high water mark (HWM); 1136.0ha along riverbanks/around ponds.	No As the Proposed Project would not have any direct impacts on habitats, or result in any habitat loss, within the SAC the extent of terrestrial habitat available to otter would not be affected.	No	No potential for effects.
Extent of marine habitat (hectares)	No significant decline. Area mapped and calculated as 857.7ha.			
Extent of freshwater (river) habitat (kilometres)	No significant decline. Length mapped and calculated as 616.6km.			
Extent of freshwater (lake) habitat (hectares)	No significant decline. Area mapped and calculated as 2.6ha.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Couching sites and holts (number)	No significant decline.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could (at least temporarily) potentially have significant negative effects on the usage of holt/couch sites available for otter in the SAC, or could impact fish through silt smothering spawning grounds or affecting respiration, chemical contaminants physically damaging fish or causing mortality as a result of toxins. Such impacts could result in a reduction in fish numbers, at least temporarily.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Fish biomass available (kilograms)	No significant decline.			
Mortality risk posed by construction works	Not defined in any existing conservation objectives document.	Yes The mortality risk posed to otter by construction works is related to both direct mortality, due to potential interaction with construction machinery/vehicles (especially the risk of holt damage/collapse), and/or indirect mortality, due to an accidental pollution event resulting in mortality through contaminant/toxin poisoning. Although the SAC is more than 11km from the watercourses crossed by the Proposed Project, otters can have home ranges extending over tens of kilometres and there is the potential that otters using watercourses hydrologically linked to the SAC form part of, or are linked to, the qualifying interest otter population of the River Barrow and River Nore SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Barrow and River Nore SAC are avoided (Section 7.4.4). Although no otter holts or couch sites are directly impacted by the Proposed Project, there is the potential that new holts/couch sites would be created at watercourse crossings before construction commences. Therefore, pre-construction surveys would be undertaken to identify any changes in holt/couch locations and, if present and impacted by construction works, ensure they are protected and/or removed whilst avoiding any direct impacts on Otter (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Killarney fern (*Trichomanes speciosum*) [1421] **To maintain the favourable conservation condition of the habitat in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:**				
Distribution (location)	No decline. Three locations known (>100km downstream of the Proposed Project), with three colonies of gametophyte and one sporophyte colony.	No Considering the species is located ca. >100km from the Proposed Project, and that no construction works will occur outside the Proposed Project site boundary, there is no potential for impacts on the attributes and targets associated with the habitat distribution and extent and/or on the population size or structure of Killarney fern.	No	No potential for effects.
Population size (number)	Maintain at least three colonies of gametophyte, and at least one sporophyte colony of over 35 fronds.			
Population structure: juvenile fronds (occurrence)	At least one of the locations to have a population structure comprising sporophyte, unfurling fronds, 'juvenile' sporophyte and gametophyte generations.			
Habitat extent (m²)	No loss of suitable habitat, such as shaded rock crevices, caves or gullies in or near to, known colonies. No loss of woodland canopy at or near to known locations			
Hydrological conditions: visible water (occurrence)	Maintain hydrological conditions at the locations so that all colonies are in dripping or damp seeping habitats, and water is visible at all locations	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to the three known locations within the River Barrow and River Nore SAC, which are (>100km downstream of the Proposed Project). As the Killarney fern is a terrestrial species with no intrinsic dependence on surface water interactions, the Proposed Project poses no risk of affecting most of the attributes and targets supporting hydrological conditions.	No	No potential for effects.
Hydrological conditions: humidity (number of desiccated fronds)	No increase. Presence of desiccated sporophyte fronds or gametophyte mats indicates conditions are unsuitable			
Light levels: shading (percentage)	No changes due to anthropogenic impacts	Yes Although unlikely, given the SAC is more than 100km downstream of the Proposed Project, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial habitats along the shores of the River Barrow could be spread to habitats supporting the Killarney fern in the River Barrow and River Nore SAC via the surface water network. Introducing plant INNS could negatively affect the quality of the habitat supporting Killarney fern colonies in the SAC through changes in canopy cover, for example.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Barrow and River Nore SAC (Section 7.4.4).	No potential for effects, following the implementation of mitigation measures.
Invasive species (occurrence)	Absent or under control			

7.4.4 Design Requirements and Mitigation Measures

1070. The positioning of the infrastructure associated with the Proposed Project has been designed to avoid European sites, where possible, and to minimise the risks of indirect effects as far as is possible. The design measures are described in Section 3.5.

7.4.4.1.1 Construction Phase Mitigation

1071. The mitigation measures to protect water quality in the receiving environment during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example: the use of sandbags, silt curtains or similar barriers, buffers of natural uncleared vegetation, and suspension of works within and adjacent to watercourses during periods of heavy rainfall. Such mitigation measures are considered best practice and are in accordance with IFI (2016) guidelines. Based on the predicted significance of effect, mitigation is not required beyond the primary mitigation described in Section 7.1.4.3. However, during the Construction Phase of the Proposed Project, the following additional mitigation will also be implemented as this is considered appropriate best practice:

- Silt traps will be installed at intervals, ideally as close as possible to the source of the sediment. Each site will be assessed regarding sediment management, and appropriate plans adopted. Where required, correctly planned, installed and maintained sediment traps for each individual site will help to ensure that water quality is protected. Ongoing monitoring will be necessary to indicate the need for additional silt traps
- A series of smaller silt traps, which are more effective than a limited number of larger silt traps, will be used
- Steeper sites may require additional silt traps
- Additional silt traps may be required where the buffer is deemed ineffective, for example not vegetated or where the silt traps are not fully functional
- Silt fencing will remain in place until the completion of the construction works
- Additional site fencing will be placed adjacent to storage areas of stockpiled soil, until such time as the excavated soil has been used in landscaping/reinstatement works or removed off site by a licensed waste contractor
- Daily visual inspections will be undertaken of the watercourse downstream of the proposed works and of silt control features
- Spill kits, with an adequate stock of spill clean-up materials such as booms and absorbent pads, will be readily available during construction works
- The appointed Contractor will ensure the relevant site personnel are trained in spillage control
- In the unlikely event of a hydrocarbon spillage, contaminated spill clean-up material will be properly disposed of to a licensed waste contractor
- In the unlikely event of a suspected deterioration in water quality as a result of the proposed works, works will immediately cease and an investigation into the cause will be undertaken and the relevant NPWS and IFI personnel informed.

1072. The mitigation measures to ensure that INNS are not spread or introduced to the River Barrow and River Nore SAC during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example: the thorough cleaning of plant and equipment using a power washer unit prior to leaving site in accordance with the OPW Environmental Standard Operating Procedures (OPW 2011) and/or IFI Biosecurity Protocols (IFI 2010).

1073. The mitigation measures to ensure that aquatic species are not killed during the Construction Phase as a result of construction works directly, or through water quality impacts, are as detailed in Section 7.1.4

and in the CEMP (see EIAR Appendix A5.1) and include that no machinery will operate in-stream. If watercourses have to be traversed during construction, these will be bridged prior to commencement of works.

1074. The mitigation measures to ensure that in-stream works do not pose a long-term barrier to fish species movement within the Figile River catchment, are the same as those detailed in Section 7.1.4 for the Lower River Shannon catchment and in the CEMP (see EIAR Appendix A5.1).

7.4.4.1.2 Operational Phase Mitigation

1075. The mitigation measures to protect water quality in the receiving environment during the Operational Phase are similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

1076. The mitigation measures to ensure that INNS are not spread or introduced to the River Barrow and River Nore SAC during the Operational Phase are also similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

7.4.5 Residual Impacts

1077. The Proposed Project has the potential to negatively affect water quality in the receiving surface water environment during the Construction Phase and the Operational Phase and, as watercourses crossed by the Proposed Project drain to the River Barrow, there is the potential for the conservation objectives of the River Barrow and River Nore SAC to be negatively affected. Mitigation measures will be implemented to ensure that the receiving surface water network is protected, and the conservation objectives of the River Barrow and the River Barrow and River Nore SAC are not negatively affected by the Proposed Project.

1078. The Proposed Project has the potential to spread and introduce INNS to the River Barrow and River Nore SAC via the Figile River, which drains to the River Barrow. The confluence of the Figile River and the River Barrow is within the boundaries of the River Barrow and River Nore SAC. Mitigation measures will be implemented to ensure that any INNS present within the Construction Working Width or the 20m wide Permanent Wayleave are controlled and are not spread to the River Barrow, and that the conservation objectives of the River Barrow and River Nore SAC are not negatively affected by the Proposed Project.

1079. The Proposed Project has the potential to result in the mortality of aquatic species such as otter, lamprey and Atlantic salmon during the Construction Phase which may potentially affect their populations in the River Barrow and River Nore SAC. Mitigation measures will be implemented to ensure that protected fauna are not killed as a result of construction works, or as a result of a reduction in water quality in receiving water bodies, and that the conservation objectives of the River Barrow and River Nore SAC that support the qualifying interest populations are not negatively affected by the Proposed Project.

1080. The Proposed Project has the potential to result in a long-term barrier to lamprey and Atlantic salmon movement within the Figile River catchment which is linked to the River Barrow and River Nore SAC and may support the qualifying interest populations of the SAC. Mitigation measures will be implemented to ensure that post construction, the reinstatement of river/stream channels after in-stream works would not present a barrier to fish species movement, and that the conservation objectives of the River Barrow and River Nore SAC that support the qualifying interest lamprey and Atlantic salmon populations are not negatively affected by the Proposed Project.

1081. There are therefore, no residual direct or indirect impacts associated with the Proposed Project that could adversely affect the integrity of the River Barrow and River Nore SAC.

7.4.6 Conclusion of Assessment for River Barrow and River Nore SAC 2162

1082. None of the potential direct or indirect impacts associated with the Proposed Project would affect the conservation objectives of any of the qualifying interest habitats or species of the River Barrow and River Nore SAC. Mitigation measures are included to ensure that water quality in the receiving surface water environment is protected from silt generated from construction works, thereby protecting freshwater pearl mussel; that INNS are not spread or introduced to the River Barrow and River Nore SAC; that qualifying interest species are not killed during the Construction Phase; and that post construction, there are no restrictions to fish species movements within catchments crossed by the Proposed Project.

1083. The examination, analysis and evaluation covered all relevant information in respect of the qualifying interest habitats and species of the SAC. This included the potential impacts, mitigation and prevention measures, and whether or not the predicted impacts would affect the conservation objectives that support the conservation condition for the qualifying interests concerned (either directly or indirectly; refer to Section 8 for the in-combination assessment). It has been concluded beyond reasonable scientific doubt that, subject to the implementation of mitigation measures, the Proposed Project would not adversely affect the integrity of River Barrow and River Nore SAC.

7.5 Lough Derg, North-east Shore SAC 2241

7.5.1 Qualifying Interests and Conservation Objectives of Lough Derg, North-east Shore SAC 2241

1084. The qualifying interest Annex I habitats and species of the Lough Derg, North-east Shore SAC, and the overall conservation objective for each, are listed in Table 7.15.

Table 7.15: Qualifying Interests and Conservation Objectives of Lough Derg, North-east Shore SAC (NPWS 2019e)

Qualifying Interests	Conservation Objectives
Annex I Habitats	
Juniperus communis formations on heaths or calcareous grasslands [5130]	To restore favourable conservation condition.
*Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210]	To maintain or restore favourable conservation condition.
Alkaline fens [7230]	
*Limestone pavements [8240]	
*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]	
**Taxus baccata* woods of the British Isles [91J0]	

1085. In conjunction with considering the generic conservation objective, to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected, the available site-specific conservation objectives document for Lough Derg, North-east Shore SAC (NPWS 2019e) also informed this assessment. This document sets out the attributes, measures and targets that define the favourable conservation condition of qualifying interest habitats and species within the European site.

7.5.2 Ecological Baseline Description for Lough Derg, North-east Shore SAC 2241

1086. Lough Derg, the lowest-order lake on the River Shannon, is one of the largest bodies of freshwater in Ireland. This SAC, however, only includes the northern shore of the lake from the mouth of the Cappagh River in the north-west to just below Black Lough at the north-eastern shore. The geology of the lake shore is principally limestone and in places this protrudes at the surface in the form of boulders and rubble, and can be classified as limestone pavement. These are often bryophyte-rich surfaces or else support a calcareous grassland or heath flora, as well as some woody species, such as yew (*Taxus baccata*) and juniper (*Juniperus communis*) (DAHG 2014a).

1087. A second priority Annex I habitat, *Cladium* fen, occurs occasionally along the lake margins, mainly in association with alkaline fens, common reed and other swamp vegetation. Typically, great fen-sedge (*Cladium mariscus*), which can be up to 2m in height, forms dense stands. Associated species include common reed, black bog-rush, water horsetail (*Equisetum fluviatile*), bottle sedge (*Carex rostrata*) and occasional slender sedge (*Carex lasiocarpa*). This community generally merges with alkaline fen dominated by black bog-rush, with purple moor-grass, marsh horsetail (*E. palustre*), meadowsweet and scattered tussocks of greater tussock-sedge (*Carex paniculata*) (DAHG 2014a).

1088. Yew woods in Ireland are mostly confined to the west of the country. However, a substantial area of yew is located on limestone at Cornalack, where yew forms a scrub woodland along the east shore of Lough Derg. Here, yew is found in association with small amounts of juniper, which forms protection against grazing for the young yew. Other notable species present include hawthorn, hazel, holly, small-leaved cotoneaster (*Cotoneaster microphyllus*), along with occasional ivy, wild strawberry (*Fragaria vesca*), bramble and wood-sorrel. Elsewhere, small stands of yew up to 5m high occur with spindle (*Euonymus europaeus*), blackthorn, gorse and ash (DAHG 2014a).

1089. Juniper occurs throughout this site in a range of habitats, associated with calcareous grasslands, heath and limestone outcrops. Some of the finest examples of juniper formations in Ireland occur along the lake edge where upright, bushy juniper shrubs up to 3m tall are found. Typically, juniper forms dense hedges with ash, hawthorn, gorse, hazel and bramble, and occasional yew. These tall juniper shrubs are a unique feature in Ireland, where it is more typically found growing in prostrate form. In places along the lake shore juniper forms a mosaic with black bog-rush and great fen-sedge fen. The best examples are seen at the north and north-east of the site. On drier ground above the flood level, juniper occurs in association with species-rich calcareous grassland with mouse-ear hawkweed (*Pilosella officinarum*), daisy (*Bellis perennis*), lady's bedstraw (*Galium verum*), wild thyme (*Thymus drucei*) and blue moor-grass (*Sesleria caerulea*). An extensive area of this vegetation is seen north of Kilgarvan Quay. Many of the islands also support significant juniper cover. This is particularly evident on Bounla Island. Juniper generally occurs as fringing vegetation around the islands, which typically have wooded centres. At Cornalack, along the eastern shore of Lough Derg, tall juniper is found in association with loose limestone rubble with a significant cover of yew (DAHG 2014a).

1090. Deciduous woodlands are also a notable feature of the site, dominated by oak (*Quercus* spp.), as at Bellevue, and hazel/ash at many of the examples along the north-eastern shore. The only known site in the country for the Red Data Book plant Irish fleabane (*Inula salicina*) occurs along the lake shore. This plant is legally protected under the Flora (Protection) Order, 2022. Other Red Data Book species present within this site are marsh pea (*Lathyrus palustris*) and ivy broomrape. The Red Data Book stonewort (*Chara tomentosa*) has its stronghold in Lough Derg (DAHG 2014a).

1091. The lake is rated as nationally important for waterfowl. The entire lake, including all of the islands, is a designated SPA (Section 7.12).

1092. Lough Derg is of conservation interest also for its fish and freshwater invertebrates. Lampreys, listed under Annex II of the Habitats Directive, are known to occur and the lake contains an apparently self-sustaining landlocked population of sea lamprey. Brook lamprey is known to be common in the Lower

Shannon catchment where all three lamprey species breed. The endangered fish species pollan is recorded from Lough Derg, one of only three sites in Ireland and in western Europe. Lough Derg is also a well-known fishing lake with a good trout (*Salmo trutta*) fishery. Atlantic salmon also use the lake as a spawning ground. Otter and badger have been recorded within the site (DAHG 2014a).

1093. This is a site of significant ecological interest, with six habitats listed on Annex I of the Habitats Directive. Four of these are priority habitats - *Cladium* fen, alluvial woodland, limestone pavement and yew woodland. Other annexed habitats present include alkaline fen and juniper scrub formations on heath and calcareous grasslands. In addition, the lake itself is an SPA that supports important numbers of wintering wildfowl, Greenland white-fronted goose, common tern and cormorant, a number of which are listed under Annex I of the Birds Directive (DAHG 2014a).

1094. The Proposed Project boundary is located 3.7km south of the Lough Derg, North-east Shore SAC boundary (at its closest point, i.e. the pipeline corridor), and does not overlap with this European site. The hydrogeological ZoI of the Proposed Project does not extend to 3.7km and poses no direct risk of hydrogeological effects within Lough Derg, North-east Shore SAC. However, the Proposed Project does cross numerous watercourses that drain to Lough Derg, North-east Shore SAC more than 4km away, including: the Little Brosna River, the Rock [Birr] River, the Camcor River, the Silver River, the Clodiagh River and the Tullamore River (refer to Appendix J: Watercourse Crossings and Pathways to European Sites, for more details and EIAR Figure 8.4 to Figure 8.108 for the locations of the watercourse crossings).

7.5.3 Examination and Analysis of Potential Direct and Indirect Impacts

1095. As the Proposed Project does not overlap with Lough Derg, North-east Shore SAC, none of the qualifying interest habitats would be directly impacted. Lough Derg, North-east Shore SAC (and potential ex-situ sites) also lies beyond the ZoI of any hydrogeological or air quality impacts.

1096. However, in the absence of mitigation measures, the Proposed Project's impacts described in the following sections could potentially affect the conservation objective attributes and targets supporting the conservation condition of the qualifying interests of Lough Derg, North-east Shore SAC.

7.5.3.1 Construction Phase

7.5.3.1.1 Habitat Degradation as a Result of Excavation and Tunnelling

1097. The only influence tunnelling or excavation works associated with the Proposed Project could have on Lough Derg, North-east Shore SAC is indirectly during the pipeline installation works at the watercourse crossings, where there is a risk of water quality impacts in the receiving watercourses regardless of whether open cut or trenchless techniques are used. This is discussed further below in the hydrological impacts section.

7.5.3.1.2 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1098. As the Proposed Project crosses watercourses that drain to Lough Derg, North-east Shore SAC, construction works at these watercourse crossings pose a risk of affecting water quality in the European site through increasing silt-sediment loading, accidental spillage of cement-based products, accidental spillage of hydrocarbons or through faecal contamination arising from on-site toilets and washing facilities.

1099. Affecting water quality in receiving watercourses and in Lough Derg, North-east Shore SAC has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats that interact with the aquatic environment.

7.5.3.1.3 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1100. As the Proposed Project would involve instream construction works on watercourses that drain to Lough Derg, North-east Shore SAC, there is the potential that INNS could be introduced to the surface water network and establish populations downstream in the European site.

1101. Introducing INNS to Lough Derg, North-east Shore SAC has the potential to affect the conservation objectives supporting the conservation condition of some of the qualifying interest habitats.

7.5.3.2 Operational Phase

7.5.3.2.1 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1102. The Lough Derg, North-east Shore SAC lies upstream of the abstraction point, and the flow through the waters offshore and the retention time of water in the bays at the north of the lake are consequently not affected by the abstraction.

1103. The only possible mechanism of potential impact, therefore, is the potential impact on water levels arising from the abstraction approximately 22km downstream (as the crow flies) at Parteen Basin, and the magnitude and distribution in time of these variations.

1104. It must be understood that the water level on Lough Derg at present is highly artificial in that it is managed year-round, primarily for hydropower, secondarily for navigation and in a collateral way to attenuate flooding insofar as possible. The only outflows are the compensation water (i.e. the minimum statutory compensation water flow of $10m^3/s$ directed to the Old River Shannon at Parteen Weir), and the flow through Ardnacrusha. The latter is driven by the daily and weekly power requirements of the national grid.

1105. The shoreline flora and fauna have, over many decades, come into equilibrium with the water level regime corresponding to this control. As previously mentioned, since the late 1970s, and arising from considerations of embankment safety, ESB has operated a 460mm deep Normal Operating Band on Lough Derg, and water level has been consistently managed to remain within this band, except where periods of flooding cause its upper limit to be exceeded.

1106. In assessing potential hydrological/surface water quality impacts, the following should be borne in mind:

- ESB normally manages the Normal Operating Band to be near full in late spring, before the onset of summer conditions, and to be at the lower end in autumn, in anticipation of incoming wet weather flows
- Even in a drought year such as 2018, the lowest recorded levels were in April and December, and not at all in the summer months. These lowermost levels, recorded naturally, pre-abstraction, were substantially the same as the model predicted levels post abstraction in August 2018 (EIAR Appendix 9.1, of Chapter 9: Water)
- Natural daily water level difference, across Lough Derg from north to south, due to wind effects and flow gradient, averaged 110mm (from the period 10 June 2018 to 31 August 2019), had a standard deviation of 60mm, had a minimum of 10mm and can exceed 400mm in storm events.

1107. The impacts to Lough Derg (and Parteen Basin) Lake levels due to the modelled inclusion of the Proposed Project abstraction (as a constant flow of either 154Mld or 300Mld) are barely distinguishable from the baseline case when viewed on level/flow duration curves (a standard hydrological method for comparing long-term data series). The level regimes of Lough Derg (and Parteen Basin) are only simulated to be affected by the Proposed Project abstraction during extreme drought periods and in the days immediately after the drought (up to a week) when inflow is needed to replenish any deficit in storage caused by the Proposed Project abstraction. From the 52-year period model simulation period

(1972-2023), the simulated Lake levels are only found to be notably affected by the inclusion of the Proposed Project during the 1995 and 2018 drought events, with all other years showing no perceptible impacts. Therefore, for approximately 99% of the 52-year model simulation period, there are no perceptible impacts to simulated Lake levels as a result of the Proposed Project abstraction. Even during the worst modelled drought event (2018) from the 52-year model simulation period, the size and rate of simulated Lake level change fits within the range of ESB normal observed Lake level fluctuations seen within the historical recorded levels and are still within the Normal Operating Band on Lough Derg and within the upper and lower water level that ESB applies to Parteen Basin.

1108. When it is recalled that these are modelling results assuming the historic recorded generation pattern is unchanged, the barely distinguishable change from the baseline would, from the viewpoint of littoral vegetation, be indistinguishable from the range of difference attributable to wind effects alone.

1109. Although there would not be any routine discharges to the surface water network during the Operational Phase, Washout Valves would be located along the pipeline to facilitate planned repair and maintenance works (every 20-25 years). The water will be dechlorinated before discharge using dechlorination chemicals and there is therefore a risk to water quality in receiving watercourses from accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. Repair and maintenance works may require excavations to repair or replace sections of pipeline which pose a risk of affecting water quality in the surface water network. Affecting water quality in receiving watercourses and in Lough Derg, North-east Shore SAC has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats that interact with the aquatic environment.

7.5.3.2.2 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1110. During the Operational Phase, repair and maintenance works may be required to sections of the pipeline within the Proposed Project, which cross watercourses that drain to Lough Derg, North-east Shore SAC. There is a risk that plant INNS may colonise lands within the 20m wide Permanent Wayleave post-construction and therefore, a risk that repair and maintenance works could potentially introduce INNS to the surface water network and establish populations downstream in the European site.

1111. Introducing INNS to Lough Derg, North-east Shore SAC has the potential to affect the conservation objectives supporting the conservation condition of some of the qualifying interest habitats.

7.5.3.3 Summary

1112. Table 7.16 presents a summary of the potential impacts on the qualifying interests of the Lough Derg, North-east Shore SAC as a result of the Proposed Project and how these impacts affect the site's conservation objectives. Those highlighted in blue are the qualifying interests which are present within the ZoI of the Proposed Project that could potentially be impacted.

Table 7.16: Qualifying Interests of the Lough Derg, North-east Shore SAC and Summary of Potential Impacts

Qualifying Interests	Potential Impacts	
	Construction Phase	Operational Phase
Annex I Habitats		
Juniperus communis formations on heaths or calcareous grasslands [5130]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
*Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
Alkaline fens [7230]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
*Limestone pavements [8240]	No potential impact pathway	
*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
**Taxus baccata* woods of the British Isles [91J0]	No potential impact pathway	

1113. The specific attributes and targets used to define the conservation objectives of the qualifying interest habitats and species of the Lough Derg, North-east Shore SAC are presented in Table 7.17, along with the potential impacts associated with the Proposed Project. Those qualifying interests, and the supporting attributes, measures, and targets at risk of being affected by the Proposed Project are highlighted in blue.

Table 7.17: Potential Impacts on the Conservation Objectives of Lough Derg, North-east Shore SAC

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
***Juniperus communis* formations on heaths or calcareous grasslands [5130]** **To restore the favourable conservation condition of *Juniperus communis* formations on heaths or calcareous grasslands in Lough Derg, North-east Shore SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality downstream in Lough Derg and any associated *Juniperus communis* formations in Lough Derg, North-east Shore SAC. Although Lough Derg, North-east Shore SAC boundary is more than 4km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via watercourses crossed by the Proposed Project, to *Juniperus communis* formations within the SAC. These impacts could negatively affect the area, the distribution, or the number and proximity of *Juniperus communis* formations in Lough Derg, North-east Shore SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in Lough Derg, North-east Shore SAC are avoided (Section 7.5.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Lough Derg, North-east Shore SAC (Section 7.5.4).	No potential for effects, following the implementation of mitigation measures.
Habitat distribution (occurrence)	No decline, subject to natural processes.			
Juniper formation size (number and proximity of juniper plants)	At least 50 juniper plants present with each plant separated by no more than 20m.			
Vegetation structure: female fruiting plants (percentage in a representative number of 5m x 5m monitoring stops or in an ad hoc count of 50 plants)	Fruiting females comprise at least 10% of juniper plants rooted in plot in at least 50% of stops or in an ad hoc count of 50 plants.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality in the Ballyfinboy Stream and Ardcrony Stream catchments and downstream in Lough Derg and therefore impact on any associated *Juniperus communis* formations in Lough Derg, North-east Shore SAC. Although Lough Derg, North-east Shore SAC boundary is more than 4km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread to Lough Derg, via the Ballyfinboy Stream and Ardcrony Stream catchments, to *Juniperus communis* formations within the SAC. These impacts could negatively affect the vegetation structure, the vegetation composition, the physical structure, the formation structure, or the abundance of locally distinctive species associated with *Juniperus communis* formations in Lough Derg, North-east Shore SAC.		
Vegetation structure: Seedling recruitment (presence in a representative number of 5m x 5m monitoring stops)	At least one seedling recorded in at least one monitoring stop.			
Vegetation structure: live juniper (percentage in a representative number of 5m x 5m monitoring stops or across the site as a whole)	At least 90% of juniper plants rooted in plot alive in at least 75% of stops or across the site as a whole.			
Vegetation composition: negative indicator species (percentage in a representative number of 5m x 5m monitoring stops)	Total cover of negative indicator species to be less than 10% in at least 50% of stops.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Physical structure: Germination niches (percentage in a representative number of 5m x 5m monitoring stops)	At least 5% bare soil and/or at least 5% bare rock in at least 50% of stops.	Cont. - as above	Cont. - as above	Cont. - as above
Formation structure: browning/die-back of plants (percentage of juniper cover in a representative number of 5m x 5m monitoring stops)	Browning or dead juniper branches (excluding fully dead plants) comprise no more than 20% of total juniper cover in plot in at least 75% of stops.			
Formation structure: evidence of browsing and bark stripping (occurrence across a representative number of 5m x 5m monitoring stops)	Recent browsing of juniper plants and bark stripping and trampling due to browsers evident in no more than 50% of stops.			
Indicators of local Distinctiveness (occurrence and population size)	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat.			
***Calcareous fens with *Cladium mariscus* and species of the [7210]** **To maintain the favourable conservation condition of Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae** in Lough Derg, North-east Shore SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on water quality downstream in Lough Derg and any associated *Cladium* fen habitat in Lough Derg, North-east Shore SAC. Although Lough Derg, North-east Shore SAC boundary is more than 4km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via watercourses crossed by the Proposed Project, to *Cladium* fen habitat within the SAC. These impacts could negatively affect the area or the distribution of *Cladium* fen habitat in Lough Derg, North-east Shore SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in Lough Derg, North-east Shore SAC are avoided (Section 7.5.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Lough Derg, North-east Shore SAC (Section 7.5.4).	No potential for effects, following the implementation of mitigation measures.
Habitat distribution (occurrence)	No decline, subject to natural processes.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Ecosystem function: peat formation (percentage cover of peat-forming vegetation and water table levels)	Maintain active peat formation, where appropriate.	No The Ballyfinboy Stream and Ardcrony Stream catchments would be crossed by the Proposed Project upstream of Lough Derg, North-east Shore SAC. The pipeline at the stream crossings would be installed using open cut techniques and although there is a risk of temporary (ranging from one week up to one month in a worst-case scenario) changes to the hydrological regime in those watercourses during the Construction Phase, there is no significant long-term or permanent risk to the functioning of the hydrological regime on Lough Derg supporting *Cladium* fen habitat in Lough Derg, North-east Shore SAC.	No	No potential for effects.
Ecosystem function: hydrology – groundwater levels (Water levels (centimetres); duration of levels; hydraulic gradients)	Maintain, or where necessary restore, appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat.			
Ecosystem function: hydrology – surface water flow (drain density and form)	Maintain, or where necessary restore, as close as possible to natural or semi-natural, drainage conditions.			
Ecosystem function: water quality (water chemistry measures)	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on water quality in the Ballyfinboy Stream and Ardcrony Stream catchments which drain to Lough Derg, North-east Shore SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in Lough Derg, North-east Shore SAC are avoided (Section 7.5.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: typical species (percentage cover at a representative number of 2m x 2m monitoring stops)	Maintain adequate cover of typical species, including brown mosses and vascular plants.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality in the Ballyfinboy Stream and Ardcrony Stream catchments and downstream in Lough Derg and therefore impact on any associated *Cladium* fen habitat in Lough Derg, North-east Shore Fen SAC. Although Lough Derg, North-east Shore SAC boundary is more than 4km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread to Lough Derg, via the Ballyfinboy Stream and Ardcrony Stream catchments, to *Cladium* fen habitat within the SAC. These impacts could negatively affect the abundance/diversity of brown moss and vascular plant species or the percentage cover of native indicator species associated with *Cladium* fen habitat in Lough Derg, North-east Shore SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in Lough Derg, North-east Shore SAC are avoided (Section 7.5.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Lough Derg, North-east Shore SAC (Section 7.5.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: native negative indicator species (percentage cover at a representative number of 2m x 2m monitoring stops)	Cover of native negative indicator species at insignificant levels.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation composition: non-native species (percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops)	Cover of non-native species less than 1%.	Yes Although Lough Derg, North-east Shore SAC boundary is more than 4km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread to Lough Derg, via the Ballyfinboy Stream and Ardcrony Stream catchments, to *Cladium* fen habitat within the SAC. This impact could negatively affect the vegetation composition of *Cladium* fen habitat in Lough Derg, North-east Shore SAC.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Lough Derg, North-east Shore SAC (Section 7.5.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: trees and shrubs (percentage cover in local vicinity of a representative number of monitoring stops)	Cover of scattered native trees and shrubs not more than 10%.	No The Ballyfinboy Stream and the Ardcrony Stream catchments are the only potential impact pathways connecting the Proposed Project to *Cladium* fen habitat within Lough Derg, North-east Shore SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of increasing the cover of native trees and shrubs (see above for discussion on INNS).	No	No potential for effects.
Indicators of local distinctiveness (occurrence and population size)	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes. This includes species on the Flora (Protection) Order, 2022 and/or the red data lists.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality in the Ballyfinboy Stream and Ardcrony Stream catchments and downstream in Lough Derg and therefore impact on any associated *Cladium* fen habitat in Lough Derg, North-east Shore SAC. Although Lough Derg, North-east Shore SAC boundary is more than 4km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread to Lough Derg, via the Ballyfinboy Stream and the Ardcrony Stream, to *Cladium* fen habitat within the SAC. These impacts could negatively affect the vegetation composition, and the abundance of locally distinctive species, in *Cladium* fen habitat in Lough Derg, North-east Shore SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in Lough Derg, North-east Shore SAC are avoided (Section 7.5.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Lough Derg, North-east Shore SAC (Section 7.5.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Alkaline fens [7230] **To maintain the favourable conservation condition of Alkaline fens in Lough Derg, North-east Shore SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality downstream in Lough Derg and any associated alkaline fen habitat in Lough Derg, North-east Shore SAC. Although Lough Derg, North-east Shore SAC boundary is more than 4km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via watercourses crossed by the Proposed Project, to alkaline fen habitat within the SAC. These impacts could negatively affect the area of alkaline fen habitat in Lough Derg, North-east Shore SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in Lough Derg, North-east Shore SAC are avoided (Section 7.5.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Lough Derg, North-east Shore SAC (Section 7.5.4).	No potential for effects, following the implementation of mitigation measures.
Habitat distribution (occurrence)	No decline, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality downstream in Lough Derg and any associated alkaline fen habitat in Lough Derg, North-east Shore SAC. Although Lough Derg, North-east Shore SAC boundary is more than 4km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via watercourses crossed by the Proposed Project, to alkaline fen habitat within the SAC. These impacts could negatively affect the distribution of alkaline fen habitat in Lough Derg, North-east Shore SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in Lough Derg, North-east Shore SAC are avoided (Section 7.5.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Lough Derg, North-east Shore SAC (Section 7.5.4).	No potential for effects, following the implementation of mitigation measures.
Ecosystem function: soil nutrients (soil pH and appropriate nutrient levels at a representative number of monitoring stops)	Maintain soil nutrient status within natural range.	No Although the Proposed Project lies upstream of Lough Derg, North-east Shore SAC, given the nature of the Proposed Project, it poses no risk of affecting nutrient levels in receiving watercourses downstream or in alkaline fen habitat in the SAC.	No	No potential for effects.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Ecosystem function: peat formation (percentage cover of peat-forming vegetation and water table levels)	Maintain active peat formation, where appropriate.	No The Ballyfinboy Stream and the Ardcrony Stream catchments would be crossed by the Proposed Project upstream of Lough Derg, North-east Shore SAC. The pipeline at the stream crossings would be installed using open cut techniques and although there is a risk of temporary (ranging from one week up to one month in a worst-case scenario) changes to the hydrological regime in those watercourses during the Construction Phase, these temporary changes would not have a significant effect on active peat formation which occurs over a long period of time with the formation rate of about 1mm per year (Charman 2002). There is no long-term or permanent risk to the functioning of the hydrological regime on Lough Derg supporting alkaline fen habitat in Lough Derg, North-east Shore SAC.	No	No potential for effects.
Ecosystem function: hydrology – groundwater levels (water levels (centimetres); duration of levels; hydraulic gradients)	Maintain, or where necessary restore, appropriate natural hydrological regime necessary to support the natural structure and functioning of the habitat.	No The Ballyfinboy Stream and Ardcrony Stream catchments would be crossed by the Proposed Project upstream of Lough Derg, North-east Shore SAC beyond the hydrological ZoI of this SAC. The pipeline at the stream crossings would be installed using open cut techniques and although there is a risk of temporary (ranging from one week up to one month in a worst-case scenario) changes to the hydrological regime in those watercourses during the Construction Phase, there is no significant long-term or permanent risk to the functioning of the hydrological regime on Lough Derg supporting alkaline fen habitat in Lough Derg, North-east Shore SAC.	No	No potential for effects.
Ecosystem function: hydrology – surface water flow (drain density and form)	Maintain, or where necessary restore, as close as possible to natural or semi-natural drainage conditions.	No The Ballyfinboy Stream and Ardcrony Stream catchments would be crossed by the Proposed Project upstream of Lough Derg, North-east Shore SAC beyond the hydrological ZoI of this SAC. The pipeline at the stream crossings would be installed using open cut techniques and although there is a risk of temporary (ranging from one week up to one month in a worst-case scenario) changes to the hydrological regime in those watercourses during the Construction Phase, there is no significant long-term or permanent risk to the functioning of the hydrological regime on Lough Derg supporting alkaline fen habitat in Lough Derg, North-east Shore SAC.	No	No potential for effects.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Ecosystem function: water quality (water chemistry measures)	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality in the Ballyfinboy Stream and Ardcrony Stream catchments which drain to Lough Derg, North-east Shore SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in Lough Derg, North-east Shore SAC are avoided (Section 7.5.4).	No potential for effects, following the implementation of mitigation measures.
Community diversity (abundance of variety of vegetation communities)	Maintain variety of vegetation communities, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality in the Ballyfinboy Stream and Ardcrony Stream catchments and downstream in Lough Derg and therefore impact on any associated alkaline fen habitat in Lough Derg, North-east Shore SAC. Although Lough Derg, North-east Shore SAC boundary is more than 4km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread to Lough Derg, via the Ballyfinboy Stream and Ardcrony Stream catchments, to alkaline fen habitat within the SAC. These impacts could negatively affect the diversity of vegetation communities, or vegetation composition and the abundance of positive brown moss indicator species or vascular plant positive indicator species, associated with alkaline fen habitat in Lough Derg, North-east Shore SAC. These impacts could also negatively affect the vegetation composition of alkaline fen habitat in Lough Derg, North-east Shore SAC and provide suitable conditions/opportunities for negative indicator species to establish.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in Lough Derg, North-east Shore SAC are avoided (Section 7.5.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Lough Derg, North-east Shore SAC (Section 7.5.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: brown mosses (percentage cover at a representative number of 2m x 2m monitoring stops)	Maintain adequate cover of typical brown moss species.			
Vegetation composition: number of positive indicator species (vascular plants) (number of species at a representative number of 2m x 2m monitoring stops)	Number of positive vascular plant indicator species present at each monitoring stop is at least two for small-sedge flushes and at least three for black bog-rush (*Schoenus nigricans*) flush and bottle sedge (*Carex rostrata*) fen.			
Vegetation composition: negative indicator species (percentage cover at a representative number of 2m x 2m monitoring stops)	Total cover of negative indicator species less than 1%.			
Vegetation composition: non-native species (percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops)	Cover of non-native species less than 1%.	Yes Although Lough Derg, North-east Shore SAC boundary is more than 4km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread to Lough Derg, via the Ballyfinboy Stream and Ardcrony Stream catchments, to alkaline fen habitat within the SAC. This impact could negatively affect the vegetation composition of alkaline fen habitat in Lough Derg, North-east Shore SAC.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Lough Derg, North-east Shore SAC (Section 7.5.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation composition: native trees and shrubs (percentage cover in local vicinity of a representative number of monitoring stop)	Cover of scattered native trees and shrubs less than 10%.	No The Ballyfinboy Stream and the Ardcrony Stream catchments are the only potential impact pathways connecting the Proposed Project to alkaline fen habitat within Lough Derg, North-east Shore SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of increasing the cover of native trees and shrubs (see above for discussion on negative indicator species and INNS).	No	No potential for effects.
Vegetation composition: soft rush and common reed cover (percentage cover in local vicinity of a representative number of monitoring stops)	Total cover of soft rush (*Juncus effusus*) and common reed (*Phragmites australis*) less than 10%.			
Vegetation structure: height (percentage of leaves/shoots at a representative number of 2m x 2m monitoring stops)	Proportion of live leaves and/or flowering shoots of vascular plants that are more than 5cm above the ground surface should be at least 50%.	Yes Although Lough Derg, North-east Shore SAC boundary is more than 4km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread to Lough Derg, via the Ballyfinboy Stream and Ardcrony Stream catchments, to alkaline fen habitat within the SAC. This impact could negatively affect vegetation height in alkaline fen habitat in Lough Derg, North-east Shore SAC.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Lough Derg, North-east Shore SAC (Section 7.5.4).	No potential for effects, following the implementation of mitigation measures.
Physical structure: disturbed bare ground (percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops)	Cover of disturbed bare ground less than 10%.	No The Ballyfinboy Stream and the Ardcrony Stream catchments are the only potential impact pathways connecting the Proposed Project to alkaline fen habitat within Lough Derg, North-east Shore SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of increasing the percentage cover of disturbed bare ground.	No	No potential for effects.
Physical structure: drainage (percentage area in local vicinity of a representative number of monitoring stops)	Areas showing signs of drainage as a result of drainage ditches or heavy trampling less than 10%.	No The Proposed Project is remote from Lough Derg, North-east Shore SAC and would not involve any works within the SAC that would result in drainage of alkaline fen habitat or would disturb tufa formations or any vegetation associated with alkaline fen habitat.	No	No potential for effects.
Physical structure: tufa formations (percentage cover in local vicinity of a representative number of 2m x 2m monitoring stops)	Disturbed proportion of vegetation cover where tufa is present is less than 1%.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Indicators of local distinctiveness (occurrence and population size)	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat. This includes species on the Flora (Protection) Order, 2022 and/or the red data lists.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality in the Ballyfinboy Stream and Ardcrony Stream catchments and downstream in Lough Derg and therefore impact upon any rare, threatened or scarce vegetation (including species on the Flora [Protection] Order, 2022) associated with alkaline fen habitat in Lough Derg, North-east Shore SAC. Although Lough Derg, North-east Shore SAC boundary is more than 4km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread to Lough Derg, via the Ballyfinboy Stream and the Ardcrony Stream, to alkaline fen habitat within the SAC. These impacts could negatively affect the vegetation composition, and the abundance of locally distinctive species, in alkaline fen habitat in Lough Derg, North-east Shore SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in Lough Derg, North-east Shore SAC are avoided (Section 7.5.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Lough Derg, North-east Shore SAC (Section 7.5.4).	No potential for effects, following the implementation of mitigation measures.
***Limestone pavements [8240]** **To restore the favourable conservation condition of Limestone pavements* in Lough Derg, North-east Shore SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes.	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to Lough Derg, North-east Shore SAC. As Limestone pavement is a terrestrial habitat with no intrinsic dependence on surface water interactions to support the vegetation composition or structure, the Proposed Project poses no risk of affecting any of the attributes and targets supporting the favourable conservation status of limestone pavement habitat in Lough Derg, North-east Shore SAC.	No	No potential for effects.
Habitat distribution (occurrence)	No decline, subject to natural processes.			
Vegetation composition: typical species (number at a representative number of monitoring stops)	At least seven positive indicator species present.			
Vegetation composition: bryophyte layer (percentage at a representative number of monitoring stops)	Bryophyte cover at least 50% on wooded pavement.			
Vegetation composition: negative indicator species (percentage at a representative number of monitoring stops)	Collective cover of negative indicator species on exposed pavement not more than 1%.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation composition: negative indicator species (percentage at a representative number of monitoring stops)	Collective cover of negative indicator species on exposed pavement not more than 1%.	Cont. - as above	Cont. - as above	Cont. - as above
Vegetation composition: non-native species (percentage at a representative number of monitoring stops)	Cover of non-native species not more than 1% on exposed pavement; on wooded pavement not more than 10% with no regeneration.			
Vegetation composition: scrub (percentage at a representative number of monitoring stops)	Scrub cover no more than 25% of exposed pavement.			
Vegetation composition: bracken cover (percentage at a representative number of monitoring stops)	Bracken (*Pteridium aquilinum*) cover no more than 10% on exposed pavement.			
Vegetation structure: woodland canopy (percentage at a representative number of monitoring stops)	Canopy cover on wooded pavement at least 30%.			
Vegetation structure: dead wood (occurrence in a representative number of monitoring stops)	Sufficient quantity of dead wood on wooded pavement to provide habitat for saproxylic organisms.			
Physical structure: disturbance (occurrence in a representative number of monitoring stops)	No evidence of grazing pressure on wooded pavement.			
Indicators of local distinctiveness (occurrence)	Indicators of local distinctiveness are maintained. This includes species on the Flora (Protection) Order, 2022 and/or the red data lists, and other rare or localised species, as well as archaeological and geological features, which often support distinctive species.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
***Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]** **To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* in Lough Derg, North-east Shore SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes.	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to alluvial woodland habitat within Lough Derg, North-east Shore SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of affecting the woodland area, the distribution of alluvial woodlands in the SAC, or the size of alluvial woodlands in the SAC (see also woodland regeneration below in terms of potential long-term effects of introducing INNS to woodland habitats).	No	No potential for effects.
Habitat distribution (occurrence)	No decline, subject to natural processes.			
Woodland size (hectares)	Area stable or increasing. Where topographically possible, 'large' woods at least 25ha in size and 'small' woods at least 3ha in size.			
Woodland structure: cover and height (percentage and metres)	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer.	Yes Although unlikely, given the SAC boundary is more than 4km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising alluvial woodland habitats along the shores of Lough Derg could be spread to alluvial forest habitat in the SAC via the surface water network. Introducing plant INNS could negatively affect the number, abundance and diversity of native woodland species. Introducing plant INNS could affect the structure of the woodland community, most likely through plant INNS outcompeting and overgrowing the shrub and herb layers in the woodland.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Lough Derg, North-east Shore SAC (Section 7.5.4).	No potential for effects, following the implementation of mitigation measures.
Woodland structure: community diversity and extent (hectares)	Maintain diversity and extent of community types.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the sensitive woodland plant species where the habitat has a direct interaction with the shores of Lough Derg through seasonal flooding (some of which may be considered locally distinctive). Although unlikely, given the SAC boundary is more than 4km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising alluvial woodland habitats along the shores of Lough Derg could be spread to alluvial forest habitat in the SAC via the surface water network. Introducing plant INNS could negatively affect the number, abundance and diversity of any locally distinctive species. Both of these potential impacts could affect the diversity of the woodland community.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in Lough Derg, North-east Shore SAC are avoided (Section 7.5.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Lough Derg, North-east Shore SAC (Section 7.5.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Woodland structure: natural regeneration (seedling:sapling:pole ratio)	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy.	Yes Although unlikely, given the SAC boundary is more than 4km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising alluvial woodland habitats along the shores of Lough Derg could be spread to alluvial forest habitat in the SAC via the surface water network. Introducing plant INNS could affect the natural regeneration of woodland flora, most likely through plant INNS outcompeting and overgrowing the shrub and herb layers in the woodland.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Lough Derg, North-east Shore SAC (Section 7.5.4).	No potential for effects, following the implementation of mitigation measures.
Hydrological regime: flooding depth/height of water table (metres)	Appropriate hydrological regime necessary for maintenance of alluvial vegetation.	No The Ballyfinboy Stream and Ardcrony Stream catchments would be crossed by the Proposed Project upstream of Lough Derg, North-east Shore SAC. The pipeline at the stream crossings would be installed using open cut techniques and although there is a risk of temporary (ranging from one week up to one month in a worst-case scenario) changes to the hydrological regime in those watercourses during the Construction Phase, there is no significant long-term or permanent risk to the functioning of the hydrological regime on Lough Derg supporting alluvial woodland habitat in Lough Derg, North-east Shore SAC.	No	No potential for effects.
Woodland structure: dead wood (m^3 per hectare; number per hectare)	At least $30m^3$/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder (*Alnus glutinosa*)).	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to alluvial woodland habitat within Lough Derg, North-east Shore SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of affecting the abundance of dead wood in the alluvial woodlands or the numbers/abundance of woodland tree species.	No	No potential for effects.
Woodland structure: veteran trees (number per hectare)	No decline.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Woodland structure: indicators of local distinctiveness (occurrence)	No decline.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the sensitive woodland plant species where the habitat has a direct interaction with the shores of Lough Derg through seasonal flooding (some of which may be considered locally distinctive). Although unlikely, given the SAC boundary is more than 4km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial woodland habitats along the shores of Lough Derg could be spread to alluvial forest habitat in the SAC via the surface water network. Introducing plant INNS could negatively affect the number, abundance and diversity of any locally distinctive species. The Ballyfinboy Stream and Ardcrony Stream catchments would be crossed by the Proposed Project upstream of Lough Derg, North-east Shore SAC. The pipeline at the stream crossings would be installed using open cut techniques and although there is a risk of temporary (ranging from one week up to one month in a worst-case scenario) changes to the hydrological regime in those watercourses during the Construction Phase, there is no significant long-term or permanent risk on the occurrence of sensitive woodland plant species on Lough Derg supporting alluvial woodland habitat in Lough Derg, North-east Shore SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in Lough Derg, North-east Shore SAC are avoided (Section 7.5.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Lough Derg, North-east Shore SAC (Section 7.5.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: native tree cover (percentage)	No decline. Native tree cover not less than 95%. Species reported in Perrin *et al.* (2008).	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to alluvial forest habitat within Lough Derg, North-east Shore SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of affecting the numbers/ abundance/ composition of woodland tree species.	No	No potential for effects.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation composition: typical species (occurrence)	A variety of typical native species present, depending on woodland type, including alder (*Alnus glutinosa*), wouldows (*Salix* spp) and, locally, oak (*Quercus robur*) and ash (*Fraxinus excelsior*). Species reported in Perrin *et al.* (2008).	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the sensitive native woodland plant species where the habitat has a direct interaction with the River Shannon through seasonal flooding. Although unlikely, given the SAC boundary is more than 4km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial woodland habitats along the shores of Lough Derg could be spread to alluvial forest habitat in the SAC via the surface water network. Introducing plant INNS could negatively affect the number, abundance and diversity of native woodland species.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in Lough Derg, North-east Shore SAC are avoided (Section 7.5.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Lough Derg, North-east Shore SAC (Section 7.5.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: negative indicator species (occurrence)	Negative indicator species, particularly non-native invasive species, absent or under control. The following are the most common invasive species in this woodland type: beech (*Fagus sylvatica*), sycamore (*Acer pseudoplatanus*), cherry laurel (*Prunus laurocerasus*), Himalayan balsam (*Impatiens glandulifera*).	Yes Although unlikely, given the SAC boundary is more than 4km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial woodland habitats along the shores of Lough Derg could be spread to alluvial forest habitat in the SAC via the surface water network.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Lough Derg, North-east Shore SAC (Section 7.5.4).	No potential for effects, following the implementation of mitigation measures.
******Taxus baccata* **woods of the British Isles [91J0]** **To maintain the favourable conservation condition of *Taxus baccata* woods of the British Isles in Lough Derg, North-east Shore SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes.	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to Lough Derg, North-east Shore SAC. As yew woodland is a terrestrial habitat with no intrinsic dependence on surface water interactions to support the vegetation composition or structure, the Proposed Project poses no risk of affecting any of the attributes and targets supporting the favourable conservation status of yew woodland habitat in Lough Derg, North-east Shore SAC.	No	No potential for effects.
Habitat distribution (occurrence)	No decline, subject to natural processes.			
Woodland size (hectares)	Area stable or increasing.			
Woodland structure: cover and height (percentage and metres)	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and herb and bryophyte layer.			
Woodland structure: community diversity and extent (hectares)	Maintain diversity and extent of community types.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Woodland structure: natural regeneration (seedling:sapling:pole ratio)	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy.	Cont. - as above	Cont. - as above	Cont. - as above
Woodland structure: dead wood (m^3 per hectare; number per hectare)	At least 30m^3/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter.			
Woodland structure: veteran trees (number per hectare)	No decline.			
Woodland structure: indicators of local distinctiveness (occurrence)	No decline.			
Vegetation composition: native tree cover (percentage)	No decline. Native tree cover not less than 95%.			
Vegetation composition: typical species (occurrence)	A variety of typical native species present, including yew (*Taxus baccata*) and ash (*Fraxinus excelsior*).			
Vegetation composition: negative indicator species (occurrence)	Negative indicator species, particularly INNS, absent or under control.			

7.5.4 Design Requirements and Mitigation Measures

1114. The positioning of the infrastructure associated with the Proposed Project has been designed to avoid European sites, where possible, and to minimise the risks of indirect effects as far as is possible. Design measures and the positioning of infrastructure for least environment impact, are described in Section 3.5.

7.5.4.1 Construction Phase Mitigation

1115. The mitigation measures to protect water quality in the receiving environment during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example: the use of sandbags, silt curtains or similar barriers, buffers of natural uncleared vegetation, and suspension of works within and adjacent to watercourses during periods of heavy rainfall. Such mitigation measures are considered best practice and are in accordance with IFI (2016) guidelines.

1116. The mitigation measures to ensure that INNS are not spread or introduced to Lough Derg, North-east Shore SAC during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example: the thorough cleaning of plant and equipment using a power washer unit prior to leaving site in accordance with the OPW Environmental Standard Operating Procedures (OPW 2011) and/or IFI Biosecurity Protocols (IFI 2010).

7.5.4.2 Operational Phase Mitigation

1117. The mitigation measures to protect water quality in the receiving environment during the Operational Phase are similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

1118. The mitigation measures to ensure that INNS are not spread or introduced to Lough Derg, North-east Shore SAC during the Operational Phase are also similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

7.5.5 Residual Impacts

1119. The Proposed Project has the potential to negatively affect water quality in the receiving surface water environment during the Construction Phase and the Operational Phase and, as watercourses crossed by the Proposed Project drain to Lough Derg, there is the potential for the conservation objectives of Lough Derg, North-east Shore SAC to be negatively affected. Mitigation measures will be implemented to ensure that the receiving surface water network is protected and the conservation objectives of Lough Derg, North-east Shore SAC are not negatively affected by the Proposed Project.

1120. The Proposed Project has the potential to spread and introduce INNS to Lough Derg, North-east Shore SAC via the surface water network that drains to Lough Derg and Lough Derg, North-east Shore SAC. Mitigation measures will be implemented to ensure that any INNS present within the Construction Working Width or the 20m wide Permanent Wayleave are controlled and are not spread to Lough Derg, North-east Shore SAC, and that the conservation objectives of Lough Derg, North-east Shore SAC are not negatively affected by the Proposed Project.

1121. There are therefore, no residual direct or indirect impacts associated with the Proposed Project that could adversely affect the integrity of Lough Derg, North-east Shore SAC.

7.5.6 Conclusion of Assessment for Lough Derg, North-east Shore SAC 2241

1122. None of the potential direct or indirect impacts associated with the Proposed Project would affect the conservation objectives of any of the qualifying interest habitats of Lough Derg, North-east Shore SAC. Mitigation measures are included to ensure that water quality in the receiving surface water environment is protected and that INNS are not spread or introduced to Lough Derg, North-east Shore SAC.

1123. The examination, analysis and evaluation covered all relevant information in respect of the qualifying interest habitats and species of the SAC. This included the potential impacts, mitigation and prevention measures, and whether or not the predicted impacts would affect the conservation objectives that support the conservation condition for the qualifying interests concerned (either directly or indirectly; refer to Section 8 for the in-combination assessment). It has been concluded beyond reasonable scientific doubt that, subject to the implementation of mitigation measures, the Proposed Project would not adversely affect the integrity of Lough Derg, North-east Shore SAC.

7.6 Rye Water Valley/Carton SAC 1398

7.6.1 Qualifying Interests and Conservation Objectives of Rye Water Valley/Carton SAC 1398

1124. The qualifying interest Annex I habitats and species of the Rye Water Valley/Carton SAC, and the overall conservation objective for each, are listed in Table 7.18.

Table 7.18: Qualifying Interests and Conservation Objectives of Rye Water Valley/Carton SAC (NPWS 2021a)

Qualifying Interests	Conservation Objectives
Annex I Habitats	
*Petrifying springs with tufa formation (*Cratoneurion*) [7220]	To restore favourable conservation condition
Annex II Species	
Vertigo angustior (Narrow-mouthed whorl snail) [1014]	To restore favourable conservation condition
Vertigo moulinsiana (Desmoulin's whorl snail) [1016]	To maintain favourable conservation condition

1125. In conjunction with considering the generic conservation objective, to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected, the available site-specific conservation objectives document for the Rye Water Valley/Carton SAC (NPWS 2021a) also informed this assessment. This document sets out the attributes, measures and targets that define the favourable conservation condition of qualifying interest habitats and species within the European site.

7.6.2 Ecological Baseline Description for Rye Water Valley/Carton SAC 1398

1126. The Rye Water in Carton Estate is dammed at intervals, creating a series of lakes. Reed sweet-grass is frequent around the lakes, along with yellow iris (*Iris pseudacorus*), reed canary-grass (*Phalaris arundinacea*), bulrush, water forget-me-not (*Myosotis scorpioides*), marsh-marigold (*Caltha palustris*) and starworts (*Callitriche* spp.). Along the remainder of the site the river has been dredged and much of the reed fringe removed. To the north-west of Carton Bridge a small clump of willows (*Salix* spp.), with dogwood (*Cornus* sp.), alder, ash and elder (*Sambucus nigra*) occurs. The ground flora found here includes golden saxifrage (*Chrysosplenium oppositifolium*), meadowsweet, common valerian, wavy bitter-cress (*Cardamine flexuosa*) and bittersweet (*Solanum dulcamara*) (DAHG 2013c).

1127. The woods on Carton Estate are mostly old demesne woods with both deciduous and coniferous species. Conifers, including some yew – a native species, are dominant, with beech, oak (*Quercus* sp.), sycamore, ash and hazel also occurring. The ground flora is dominated by ivy, with such species as hedge woundwort (*Stachys sylvatica*), wood speedwell (*Veronica montana*), woodruff (*Galium*

odoratum), wood avens (*Geum urbanum*), common dog-violet (*Viola riviniana*), wild angelica, ramsons (*Allium ursinum*), ground-ivy (*Glechoma hederacea*) and ivy broomrape also found (DAHG 2013c).

1128. Hairy St. John's-wort (*Hypericum hirsutum*), a species legally protected under the Flora (Protection) Order, 2022, occurs in Carton Estate and there is an old record from the estate for the similarly protected hairy violet (*Viola hirta*). However, this latter species has not been recorded from the site in recent years. Another species listed in the Red Data Book, green figwort (*Scrophularia umbrosa*), occurs on the site in several locations by the Rye Water. The woods at Carton Demesne are the site of a rare Myxomycete fungus, *Diderma deplanatum* (DAHG 2013c).

1129. The marsh, mineral spring and seepage area found at Louisa Bridge supports a good diversity of plant species, including stoneworts, marsh arrowgrass (*Triglochin palustris*), purple moor-grass, sedges (*Carex* spp.), common butterwort (*Pinguicula vulgaris*), marsh lousewort (*Pedicularis palustris*), grass-of-parnassus and cuckooflower (*Cardamine pratensis*). The mineral spring found at the site is of a type considered to be rare in Europe and is a habitat listed on Annex I of the Habitats Directive. The Red Data Book species blue fleabane is found growing on a wall at Louisa Bridge (DAHG 2013c).

1130. Within the woods, blackcap, woodcock and long-eared owl have been recorded. Little grebe, coot, moorhen, tufted duck, teal and kingfisher, the latter a species listed on Annex I of the Birds Directive, occur on and about the lake (DAHG 2013c).

1131. The Rye Water is also a spawning ground for trout and Atlantic salmon, and the rare, white-clawed crayfish has been recorded at Leixlip. The latter two species are listed on Annex II of the Habitats Directive. The rare narrow-mouthed whorl snail and Desmoulin's whorl snail occur in marsh vegetation near Louisa Bridge. Both are rare in Ireland and in Europe and are listed on Annex II of the Habitats Directive. The scarce dragonfly, *Orthetrum coerulescens*, has also been recorded at Louisa Bridge (DAHG 2013c).

1132. The conservation importance of the site lies in the presence of several rare and threatened plant and animal species, and the presence of petrifying springs, a habitat type listed on Annex I of the Habitats Directive. The woods found on Carton Estate and their birdlife are of additional interest (DAHG 2013c).

1133. The Proposed Project boundary is located 4.5km south of the Rye Water Valley/Carton SAC boundary and does not overlap with this European site. Due to the low/moderate permeability and poor storage capacity, the underlying aquifers have a low and relatively short flow paths and discharge to nearby streams. The hydrogeological ZoI of the Proposed Project does not extend to 4.5km and poses no direct risk of hydrogeological effects within the Rye Water Valley/Carton SAC. However, the Proposed Project does cross watercourses that drain to the Rye Water Valley/Carton SAC more than 7km away, including the Lyreen River (and tributaries) and the Clonshanbo River (refer to Appendix J: Watercourse Crossings and Pathways to European Sites, for more details and EIAR Figure 8.4 to Figure 8.108 for the locations of the watercourse crossings).

7.6.3 Examination and Analysis of Potential Direct and Indirect Impacts

1134. As the Proposed Project does not overlap with the Rye Water Valley/Carton SAC, none of the qualifying interest habitats or species would be directly impacted. The Rye Water Valley/Carton SAC (and potential ex-situ sites) also lies beyond the ZoI of any hydrogeological, air quality or disturbance/displacement impacts.

1135. However, in the absence of mitigation measures, the Proposed Project's indirect impacts described in the following sections could potentially affect the conservation objective attributes and targets supporting the conservation condition of the qualifying interests of Rye Water Valley/Carton SAC.

7.6.3.1 Construction Phase

7.6.3.1.1 Habitat Degradation as a Result of Excavation and Tunnelling

1136. The only influence tunnelling or excavation works associated with the Proposed Project could have on the Rye Water Valley/Carton SAC is indirectly during the pipeline installation works at the watercourse crossings, regardless of whether open cut or trenchless techniques are used, where there is a risk of water quality impacts in the receiving watercourses. This is discussed further below in the hydrological impacts section.

7.6.3.1.2 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1137. Hydrostatic pressure testing would be carried out on the Treated Water Pipelines. It is proposed to abstract water from eight water bodies along the route and use the abstracted 'test water' to pressure test the pipeline (Section 5.1.2.2). This water would then be discharged through the use of washouts to land or to water bodies, or tankered away where required. In addition, there are a total of 51 Line Valves along the pipeline route. Two of these are located on the RWRMs and the other 49 are located along the Treated Water Pipeline. The two Line Valves on the RWRMs would not have washouts. Twenty of the 49 Line Valves along the Treated Water Pipeline would have washouts. Washouts at Line Valves would only be used to discharge the sweetening flows during final filling in the Commissioning Phase and the washout design flow would vary between 1l/s and 4l/s. The water used to test the pipeline would be released via one of these 20 Line Valve Washouts. These are detailed in Annex A (Water Body Crossings and Washout Valves – Detailed Assessment) of EIAR Appendix A9.2 (Pipeline Assessment). Such activities in the ZoI of the Rye Water and the Rye Water Valley/Carton SAC or its tributaries may affect water quality in the European site and has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats hydrologically linked to the European site. Mitigation measures are detailed in Section 7.1.4.3.

1138. As the Proposed Project crosses watercourses that drain to the Rye Water and the Rye Water Valley/Carton SAC, construction works at these watercourse crossings pose a risk of affecting water quality in the European site through increasing silt-sediment loading, accidental spillage of cement-based products, accidental spillage of hydrocarbons or through faecal contamination arising from on-site toilets and washing facilities.

1139. Affecting water quality in receiving watercourses and in the Rye Water Valley/Carton SAC has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats that interact with the Rye Water.

7.6.3.1.3 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1140. As the Proposed Project would involve instream construction works on watercourses that drain to the Rye Water Valley/Carton SAC, there is the potential that INNS could be introduced to the surface water network and establish populations downstream in the European site.

1141. Introducing INNS to the Rye Water Valley/Carton SAC has the potential to affect the conservation objectives supporting the conservation condition of some of the qualifying interest habitats.

7.6.3.2 Operational Phase

7.6.3.2.1 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1142. Although there would not be any routine discharges to the surface water network during the Operational Phase, Washout Valves would be located along the pipeline to facilitate planned repair and maintenance works (every 20-25 years). The water will be dechlorinated before discharge using dechlorination

chemicals and there is therefore a risk to water quality in receiving watercourses from accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. Repair and maintenance works may require excavations to repair or replace sections of pipeline which pose a risk of affecting water quality in the surface water network.

1143. Affecting water quality in receiving watercourses and in the Rye Water Valley/Carton SAC has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats that interact with the Rye Water.

7.6.3.2.2 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1144. During the Operational Phase, repair and maintenance works may be required to sections of the pipeline within the Proposed Project, which cross watercourses that drain to the Rye Water Valley/Carton SAC. There is a risk that plant INNS may colonise lands within the 20m wide Permanent Wayleave post-construction and therefore, a risk that repair and maintenance works could potentially introduce INNS to the surface water network and establish populations downstream in the European site.

1145. Introducing INNS to the Rye Water Valley/Carton SAC has the potential to affect the conservation objectives supporting the conservation condition of some of the qualifying interest habitats.

7.6.3.3 Summary

1146. Table 7.19 presents a summary of the potential impacts on the qualifying interests of the Rye Water Valley/Carton SAC as a result of the Proposed Project and how these impacts affect the site's conservation objectives. Those highlighted in blue are the qualifying interests which are present within the ZoI of the Proposed Project that could potentially be impacted.

Table 7.19: Qualifying Interests of Rye Water Valley/Carton SAC and Summary of Potential Impacts

Qualifying Interests	Potential Impacts	
	Construction Phase	Operational Phase
Annex I Habitats		
*Petrifying springs with tufa formation (*Cratoneurion*) [7220]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
Annex II Species		
Vertigo angustior (Narrow-mouthed whorl snail) [1014]	Habitat degradation – water quality impacts	Habitat degradation – water quality impacts
Vertigo moulinsiana (Desmoulin's whorl snail) [1016]	Habitat degradation – water quality impacts	Habitat degradation – water quality impacts

1147. The specific attributes and targets used to define the conservation objectives of the qualifying interest habitats and species of the Rye Water Valley/Carton SAC are presented in Table 7.20, along with the potential impacts associated with the Proposed Project. Those qualifying interests, and the supporting attributes, measures, and targets at risk of being affected by the Proposed Project are highlighted in blue.

Table 7.20: Potential Impacts on the Conservation Objectives of the Rye Water Valley/Carton SAC

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
***Petrifying springs with tufa formation (*Cratoneurion*) [7220]** **To restore the favourable conservation condition of the habitat in the Rye Water Valley/Carton SAC, which is defined by the following list of attributes and targets:**				
Habitat area (square metres)	Area stable or increasing, subject to natural processes.	No Petrifying springs develop as a result of hydrogeological processes. The Rye Water Valley/Carton SAC lies outside of the hydrogeological ZoI of the Proposed Project, which therefore cannot affect the functioning or extent of the spring sites (i.e. affect the quality or quantity of groundwater flows and tufa deposition that support the associated vegetation community) or the area covered by or distribution of petrifying spring habitat in the SAC.	No	No potential for effects.
Habitat distribution (occurrence)	No decline, subject to natural processes.			
Hydrological regime: height of water table; water flow (metres; metres per second)	Maintain appropriate hydrological regimes.	No Petrifying springs develop as a result of hydrogeological processes. The Rye Water Valley/Carton SAC lies outside of the hydrogeological ZoI of the Proposed Project and therefore, cannot affect the hydrogeological regime supporting the functioning or extent of the spring sites in the SAC (i.e. affect the quality or quantity of groundwater flows and tufa deposition that support the associated vegetation community).		
Physical structure: tufa formations (Seepage rate to the spring and groundwater quality (saturated calcium carbonate, pH, temperature and alkalinity conditions) Maintain appropriate levels of tufa formation	Maintain appropriate levels of tufa formation.	No Petrifying springs develop as a result of hydrogeological processes. The Rye Water Valley/Carton SAC lies outside of the hydrogeological ZoI of the Proposed Project and therefore, cannot affect the physical structure supporting the functioning or extent of the spring sites in the SAC (i.e. affect the quality or quantity of groundwater flows and tufa deposition that support the associated vegetation community).		

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Ecosystem function: water quality - nitrate level (mg/l)	Maintain nitrate level at less than 10mg/l.	Yes Although the Proposed Project lies upstream of the Rye Water Valley/Carton SAC, given the nature of the Proposed Project, it poses no risk of affecting nutrient levels in receiving watercourses downstream. However, an accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the nitrate levels in receiving watercourses (at least temporarily), depending upon the pollutant involved.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on aquatic or wetland habitats in the Rye Water Valley/Carton SAC are avoided (Section 7.6.4).	No potential for effects, following the implementation of mitigation measures.
Ecosystem function: water quality - phosphate level (µg/l)	Restore phosphate level to less than 15µg/l.	Yes Although the Proposed Project lies upstream of the Rye Water Valley/Carton SAC, given the nature of the Proposed Project, it poses no risk of affecting nutrient levels in receiving watercourses downstream. However, an accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the phosphate levels in receiving watercourses (at least temporarily), depending upon the pollutant involved.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on aquatic or wetland habitats in the Rye Water Valley/Carton SAC are avoided (Section 7.6.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: community diversity (Variety of vegetation communities)	Maintain variety of vegetation communities, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the sensitive plant species associated with petrifying spring sites (at least locally) where the springs have a direct interaction with the Rye Water. Although unlikely, given the SAC boundary is more than 7km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via the surface water network, to petrifying springs along the Rye Water in the SAC. Both of these potential impacts could affect the composition, structure of the vegetation communities associated with any petrifying spring sites.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on aquatic or wetland habitats in the Rye Water Valley/Carton SAC are avoided (Section 7.6.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Rye Water Valley/Carton SAC (Section 7.6.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: positive indicator species (Number per spring)	At least three positive/high quality indicator species as listed in Lyons and Kelly (2016) and no loss from baseline number.			
Vegetation composition: negative indicator species (Cover (DAFOR scale))	Potentially negative indicator species should not be Dominant or Abundant; woody species should be absent in unwooded springs; invasive species should be absent.			
Vegetation composition: algal cover (Percentage cover at, and in local vicinity of, a representative number of monitoring stops)	Cover of algae less than 2%.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation structure: sward height (centimetres)	Field layer height between 10cm and 50cm (except for bryophyte-dominated ground).			
Physical structure: trampling/dung (Cover (DAFOR scale)	Cover should not be Dominant or Abundant	No The Proposed Project boundary is 4.5km south of the SAC site boundary and poses no risk of affecting grazing levels in the Rye Water Valley/Carton SAC, therefore it would not affect the levels of trampling or dung.	No	No potential for effects.
Indicators of local distinctiveness (Occurrence and population size)	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the sensitive plant species associated with petrifying spring sites (at least locally) where the springs have a direct interaction with the Rye Water. Although unlikely, given the SAC boundary is more than 7km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via the surface water network, to petrifying springs along the Rye Water in the SAC. Both of these potential impacts could affect the distribution and population size of rare or threatened species associated with any petrifying spring sites.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on aquatic or wetland habitats in the Rye Water Valley/Carton SAC are avoided (Section 7.6.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Rye Water Valley/Carton SAC (Section 7.6.4).	No potential for effects, following the implementation of mitigation measures.
Narrow-mouthed Whorl Snail (*Vertigo angustior*) [1014] **To restore the favourable conservation condition of the species in the Rye Water Valley/Carton SAC, which is defined by the following list of attributes and targets:**				
Distribution (number of occupied 1km squares)	Population restored to baseline. There is one recorded site for the species in the SAC within the 1km grid square N9936.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the wetland habitats supporting *Vertigo angustior* in the Rye Water Valley/Carton SAC such that individuals are killed and/or the affected habitat becomes unsuitable for occupation (at least temporarily). This could affect the number of occupied sites, the number of positive samples in suitable habitat, or the quality of suitable habitat within the SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on wetland habitats in the Rye Water Valley/Carton SAC are avoided (Section 7.6.4).	No potential for effects, following the implementation of mitigation measures.
Occurrence in suitable habitat (percentage positive records in a representative number of samples)	Restore to self-sustaining population.			
Habitat quality: water levels (Hydrological regime)	Restore suitable hydrological regime, subject to natural processes.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Habitat area (hectares)	Restore area of suitable habitat, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the wetland habitats supporting *Vertigo angustior* in the Rye Water Valley/Carton SAC such that individuals are killed and/or the affected habitat becomes unsuitable for occupation (at least temporarily). This could affect the extent of suitable habitat in the SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on wetland habitats in the Rye Water Valley/Carton SAC are avoided (Section 7.6.4).	No potential for effects, following the implementation of mitigation measures.
Desmoulin's Whorl Snail (*Vertigo moulinsiana*) [1016] **To maintain the favourable conservation condition of the species in the Rye Water Valley/Carton SAC, which is defined by the following list of attributes and targets:**				
Distribution (number of occupied 1km squares)	No decline, subject to natural processes. There is one known site for this species in the SAC within the 1km grid square N9936.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the wetland habitats supporting *Vertigo moulinsiana* in the Rye Water Valley/Carton SAC such that individuals are killed and/or the affected habitat becomes unsuitable for occupation (at least temporarily). This could affect the number of occupied sites in the SAC, the number of adult snails present in affected areas, the distribution of adult snails, the area of suitable habitat, or the condition and quality of suitable habitat across the site.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on wetland habitats in the Rye Water Valley/Carton SAC are avoided (Section 7.6.4).	No potential for effects, following the implementation of mitigation measures.
Occurrence in suitable habitat (percentage positive records in a representative number of samples)	No decline, subject to natural processes. A baseline figure of 50% positive samples is set.			
Density within habitat (number of adults per sample)	No decline, subject to natural processes; at least 25% of samples should have more than 10 individuals.			
Habitat area (hectares)	Area of suitable habitat stable or increasing, subject to natural processes; no less than 0.2ha of at least suboptimal habitat.			
Habitat quality: occupied patches in at least suboptimal condition (percentage)	No decline, subject to natural processes. A baseline of 50% is set.			
Habitat quality: soil wetness (soil wetness criteria)	No decline, subject to natural processes.			

7.6.4 Design Requirements and Mitigation Measures

1148. The positioning of the infrastructure associated with the Proposed Project has been designed to avoid European sites, where possible, and to minimise the risks of indirect effects as far as is possible. The design measures are described in Section 3.5.

7.6.4.1 Construction Phase Mitigation

1149. The mitigation measures to protect water quality in the receiving environment during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example: the use of sandbags, silt curtains or similar barriers, buffers of natural uncleared vegetation, and suspension of works within and adjacent to watercourses during periods of heavy rainfall. Such mitigation measures are considered best practice and are in accordance with IFI (2016) guidelines.

1150. The mitigation measures to ensure that INNS are not spread or introduced to the Rye Water Valley/Carton SAC during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example, the thorough cleaning of plant and equipment using a power washer unit prior to leaving site in accordance with the OPW Environmental Standard Operating Procedures (OPW 2011) and/or IFI Biosecurity Protocols (IFI 2010).

7.6.4.2 Operational Phase Mitigation

1151. The mitigation measures to protect water quality in the receiving environment during the Operational Phase are similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

1152. The mitigation measures to ensure that INNS are not spread or introduced to the Rye Water Valley/Carton SAC during the Operational Phase are also similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

7.6.5 Residual Impacts

1153. The Proposed Project has the potential to negatively affect water quality in the receiving surface water environment during the Construction Phase and the Operational Phase and, as watercourses crossed by the Proposed Project drain to the Rye Water, there is the potential for the conservation objectives of the Rye Water Valley/Carton SAC to be negatively affected. Mitigation measures will be implemented to ensure that the receiving surface water network is protected, and the conservation objectives of the Rye Water Valley/Carton SAC are not negatively affected by the Proposed Project.

1154. The Proposed Project has the potential to spread and introduce INNS to the Rye Water Valley/Carton SAC via the Rye Water catchment, which drains to the Rye Water Valley/Carton SAC. Mitigation measures will be implemented to ensure that any INNS present within the Construction Working Width or the 20m wide Permanent Wayleave are controlled and are not spread to the Rye Water Valley/Carton SAC, and that the conservation objectives of the Rye Water Valley/Carton SAC are not negatively affected by the Proposed Project.

1155. There are therefore, no residual direct or indirect impacts associated with the Proposed Project that could adversely affect the integrity of the Rye Water Valley/Carton SAC.

7.6.6 Conclusion of Assessment for Rye Water Valley/Carton SAC 1398

1156. None of the potential direct or indirect impacts associated with the Proposed Project would affect the conservation objectives of any of the qualifying interest habitats or species of the Rye Water Valley/Carton SAC. Mitigation measures are included to ensure that water quality in the receiving surface water environment is protected and that INNS are not spread or introduced to the Rye Water Valley/Carton SAC.

1157. The examination, analysis and evaluation covered all relevant information in respect of the qualifying interest habitats and species of the SAC. This included the potential impacts, mitigation and prevention measures, and whether or not the predicted impacts would affect the conservation objectives that support the conservation condition for the qualifying interests concerned (either directly or indirectly; refer to Section 8 for the in-combination assessment). It has been concluded beyond reasonable scientific doubt that, subject to the implementation of mitigation measures, the Proposed Project would not adversely affect the integrity of Rye Water Valley/Carton SAC.

7.7 Charleville Wood SAC 0571

7.7.1 Qualifying Interests and Conservation Objectives of Charleville Wood SAC 0571

1158. The qualifying interest Annex I habitats and species of Charleville Wood SAC, and the overall conservation objective for each, are listed in Table 7.21.

Table 7.21: Qualifying Interests and Conservation Objectives of Charleville Wood SAC (NPWS 2021b)

Qualifying Interests	Conservation Objectives
Annex I Habitats	
*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alono-Padion, Alinion incanae, Salicion albae*) [91E0]	To restore favourable conservation condition
Annex II Species	
Vertigo moulinsiana (Desmoulin's whorl snail) [1016]	To maintain favourable conservation condition

1159. In conjunction with considering the generic conservation objective, to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected, the available site-specific conservation objectives document for Charleville Wood SAC (NPWS 2021b) also informed this assessment. This document sets out the attributes, measures and targets that define the favourable conservation condition of qualifying interest habitats and species within the European site.

7.7.2 Ecological Baseline Description for Charleville Wood SAC 0571

1160. Charleville Wood is a large woodland surrounded by estate parkland and agricultural grassland located about 3km south-west of Tullamore in County Offaly. The site, which is underlain by deep glacial deposits, includes a small lake with a wooded island, and a stream runs along the western perimeter. The woodland is considered to be one of very few ancient woodlands remaining in Ireland, with some parts undisturbed for at least 200 years (DAHG 2020).

1161. At Charleville Wood, approximately 10% of the woodland has been under-planted with conifers and other exotic trees, but the rest of the area is dominated by pedunculate oak (*Quercus robur*). There is much ash and scattered wych elm (*Ulmus glabra*), while birch (*Betula* spp.) is a feature of the boggier margins. The shrub layer is composed largely of hazel (*Corylus avellana*), hawthorn and blackthorn. The ground layer is varied, including damp flushed slopes with ramsons and drier, more open areas with a moss sward composed largely of *Rhytidiadelphus triquetris*. The fungal flora of the woodland is notable for the

presence of several rare Myxomycete species, namely *Hemitrichia calyculata*, *Perichaena depressa*, *Amaurochaete atra*, *Collaria arcyrionema*, *Stemonitis nigrescens* and *Diderma deplanata* (DAHG 2020).

1162. Wet alluvial forest is found around the lake. It is dominated by grey willow with alder and ash. The ground flora is dominated by common reed with marsh-marigold, sedges (*Carex spp*.), meadowsweet, yellow iris, gypsywort (*Lycopus europaeus*) and water mint present (DAHG 2020).

1163. Extensive swamps of bulrush and bottle sedge have developed in the lake shallows. The wooded island at its centre is famed for its long history of non-disturbance. Hazel, spindle and ivy reach remarkable sizes here (DAHG 2020).

1164. The lake is an important wildfowl habitat, supporting populations of mute swan (*Cygnus olor*) and whooper swan and a number of duck species, including teal, wigeon, shoveler (*Anas clypeata*), pochard (*Aythya ferina*) and tufted duck (DAHG 2020).

1165. A number of unusual insects have been recorded in Charleville Wood, notably *Mycetobia obscura* (Order Diptera), a species known from only one other site in Ireland. The site is also notable for the presence of a large population of the rare snail species, *Vertigo moulinsiana* (DAHG 2020).

1166. Charleville Wood is one of the most important ancient woodland sites in Ireland. The woodland has a varied age structure and is relatively intact with areas of both closed and open canopy. The understorey and ground layers are also well-represented. Alluvial forest is a priority habitat listed on Annex I of the Habitats Directive, while the rare snail species, *Vertigo moulinsiana*, is listed on Annex II of this Directive. The wetland areas, with their associated bird populations, rare insect and *Myxomycete* species, contribute further to the conservation significance of the site (DAHG 2020).

1167. The Proposed Project boundary is located 5.1km south of Charleville Wood SAC boundary and does not overlap with this European site. Due to the low/moderate permeability and poor storage capacity, the underlying aquifers have low and relatively short flow paths and discharge to nearby streams. The hydrogeological ZoI of the Proposed Project does not extend to 5.1km and poses no direct risk of hydrogeological effects within Charleville Wood SAC. However, the Proposed Project does cross watercourses within the Clodiagh and Tullamore River catchments that drain to the Charleville Wood SAC more than 5km away (refer to Appendix J: Watercourse Crossings and Pathways to European Sites, for more details and EIAR Figure 8.4 to Figure 8.108 for the locations of the watercourse crossings).

7.7.3 Examination and Analysis of Potential Direct and Indirect Impacts

1168. As the Proposed Project does not overlap with Charleville Wood SAC, none of the qualifying interest habitats or species would be directly impacted. Charleville Wood SAC (and potential ex-situ sites) also lies beyond the ZoI of any hydrogeological, air quality or disturbance/displacement impacts.

1169. However, in the absence of mitigation measures, the Proposed Project's indirect impacts described in the following sections could potentially affect the conservation objective attributes and targets supporting the conservation condition of the qualifying interests of Charleville Wood SAC.

7.7.3.1 Construction Phase

7.7.3.1.1 Habitat Degradation as a Result of Excavation and Tunnelling

1170. The only influence tunnelling or excavation works associated with the Proposed Project could have on Charleville Wood SAC is indirectly during the pipeline installation works at the watercourse crossings, regardless of whether open cut or trenchless techniques are used, where there is a risk of water quality

impacts in the receiving watercourses. This is discussed further below in the hydrological impacts section.

7.7.3.1.2 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1171. Hydrostatic pressure testing would be carried out on the Treated Water Pipelines. It is proposed to abstract water from eight water bodies along the route and use the abstracted 'test water' to pressure test the pipeline (Section 5.1.2.2). This water would then be discharged through the use of washouts to land or to water bodies, or tankered away where required. In addition, there are a total of 51 Line Valves along the pipeline route. Two of these are located on the RWRMs and the other 49 are located along the Treated Water Pipeline. The two Line Valves on the RWRMs would not have washouts. Twenty of the 49 Line Valves along the Treated Water Pipeline would have washouts. Washouts at Line Valves would only be used to discharge the sweetening flows during final filling in the Commissioning Phase and the washout design flow would vary between 1l/s and 4l/s. The water used to test the pipeline would be released via one of these 20 Line Valve Washouts. These are detailed in Annex A (Water Body Crossings and Washout Valves – Detailed Assessment) of EIAR Appendix A9.2 (Pipeline Assessment). Such activities in the ZoI of the Charleville Wood SAC or its tributaries may affect water quality in the European site and has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats hydrologically linked to the European site. Mitigation measures are detailed in Section 7.1.4.3.

1172. As the Proposed Project crosses watercourses that drain to Charleville Wood SAC, construction works at these watercourse crossings pose a risk of affecting water quality in the European site through increasing silt-sediment loading, accidental spillage of cement-based products, accidental spillage of hydrocarbons or through faecal contamination arising from on-site toilets and washing facilities.

1173. Affecting water quality in receiving watercourses and in Charleville Wood SAC has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats that interact with the Clodiagh River and the Tullamore River.

7.7.3.1.3 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1174. As the Proposed Project would involve instream construction works on watercourses that drain to Charleville Wood SAC, there is the potential that INNS could be introduced to the surface water network and establish populations downstream in the European site.

1175. Introducing INNS to Charleville Wood SAC has the potential to affect the conservation objectives supporting the conservation condition of some of the qualifying interest habitats.

7.7.3.2 Operational Phase

7.7.3.2.1 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1176. Although there would not be any routine discharges to the surface water network during the Operational Phase, Washout Valves would be located along the pipeline to facilitate planned repair and maintenance works (every 20-25 years). The water would be dechlorinated before discharge using dechlorination chemicals and there is therefore a risk to water quality in receiving watercourses from accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. Repair and maintenance works may require excavations to repair or replace sections of pipeline which pose a risk of affecting water quality in the surface water network.

1177. Affecting water quality in receiving watercourses and in Charleville Wood SAC has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats that interact with the Clodiagh River and the Tullamore River.

7.7.3.2.2 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1178. During the Operational Phase, repair and maintenance works may be required to sections of the pipeline within the Proposed Project, which cross watercourses that drain to Charleville Wood SAC. There is a risk that plant INNS may colonise lands within the 20m wide Permanent Wayleave post-construction and therefore, a risk that repair and maintenance works could potentially introduce INNS to the surface water network and establish populations downstream in the European site.

1179. Introducing INNS to Charleville Wood SAC has the potential to affect the conservation objectives supporting the conservation condition of some of the qualifying interest habitats.

7.7.3.3 Summary

1180. Table 7.22 presents a summary of the potential impacts on the qualifying interests of Charleville Wood SAC as a result of the Proposed Project and how these impacts affect the site's conservation objectives. Those highlighted in blue are the qualifying interests which are present within the ZoI of the Proposed Project that could potentially be impacted.

Table 7.22: Qualifying Interests of Charleville Wood SAC and Summary of Potential Impacts

Qualifying Interests	Potential Impacts	
	Construction Phase	**Operational Phase**
Annex I Habitats		
* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
Annex II Species		
Vertigo moulinsiana (Desmoulin's whorl snail) [1016]	Habitat degradation – water quality impacts	Habitat degradation – water quality impacts

1181. The specific attributes and targets used to define the conservation objectives of the qualifying interest habitats and species of the Charleville Wood SAC are presented in Table 7.23, along with the potential impacts associated with the Proposed Project. Those qualifying interests, and the supporting attributes, measures, and targets at risk of being affected by the Proposed Project are highlighted in blue.

Table 7.23: Potential Impacts on the Conservation Objectives of the Charleville Wood SAC

Attributes and Measures	**Target**	**Potential Impacts Requiring Mitigation?**	**Are Mitigation Measures Required?**	**Conclusion**
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0] * **To restore the favourable conservation condition of the habitat in Charleville Wood SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes.	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to alluvial forest habitat within Charleville Wood SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of affecting the forest area, the distribution of alluvial forests in the SAC, or the woodland size (see also woodland regeneration below in terms of potential long-term effects of introducing INNS to woodland habitats).	No	No potential for effects.
Habitat distribution (occurrence)	No decline, subject to natural processes.			
Woodland size (hectares)	Area stable or increasing. Where topographically possible, 'large' woods at least 25ha in size and 'small' woods at least 3ha in size.			
Woodland structure: cover and height (percentage, centimetres, metres)	Total canopy cover at least 30%; median canopy height at least 7m; native shrub layer cover 10-75%; native herb/dwarf shrub layer cover at least 20% and height at least 20cm; bryophyte cover at least 4%.	Yes Although unlikely, given the SAC boundary is more than 5km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial woodland habitats could be spread, via the surface water network, to parts of the alluvial forests around the lake in the SAC. Introducing plant INNS could affect the structure of the woodland community, most likely through plant INNS outcompeting and overgrowing the shrub and herb layers in the woodland.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Charleville Wood SAC (Section 7.7.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	**Target**	**Potential Impacts Requiring Mitigation?**	**Are Mitigation Measures Required?**	**Conclusion**
Woodland structure: community diversity and extent (hectares)	Maintain diversity and extent of community types.	Yes Although unlikely, given the SAC boundary is more than 5km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial woodland habitats could be spread, via the surface water network, to parts of the alluvial forests around the lake in the SAC. An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negatively effects on the sensitive woodland plant species (at least locally) where the habitat has a direct interaction with the Clodiagh Stream and Tullamore River through seasonal flooding. Both of these potential impacts could affect the diversity of the woodland community.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Charleville Wood SAC (Section 7.7.4). Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on habitats in Charleville Wood SAC are avoided (Section 7.7.4).	No potential for effects, following the implementation of mitigation measures.
Woodland structure: natural regeneration (seedling: sapling: pole ratio)	Seedlings, saplings and pole age-classes of target species for 91E0* woodlands and other native tree species occur in adequate proportions to ensure survival of woodland canopy.	Yes Although unlikely, given the SAC boundary is more than 5km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial woodland habitats could be spread, via the surface water network, to parts of the alluvial forests around the lake in the SAC. Introducing plant INNS could affect the natural regeneration of woodland flora, most likely through plant INNS outcompeting and overgrowing the shrub and herb layers in the woodland.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to Charleville Wood SAC (Section 7.7.4).	No potential for effects, following the implementation of mitigation measures.
Hydrological regime: flooding depth/height of water table (metres)	Appropriate hydrological regime necessary for maintenance of alluvial vegetation.	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to alluvial forest habitat within Charleville Wood SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of affecting the abundance of dead wood in the old oak woodlands.	No	No potential for effects.

Attributes and Measures	**Target**	**Potential Impacts Requiring Mitigation?**	**Are Mitigation Measures Required?**	**Conclusion**
Woodland structure: dead wood (number per hectare)	At least 19 stems/ha of dead wood of at least 20cm diameter.	No The Proposed Project would not have any adverse effect on the integrity of the Charleville Wood SAC, having regard to its conservation objectives to restore alluvial woodland structure, including dead wood, veteran trees, indicators of local distinctiveness, or indicators of overgrazing.	No	No potential for effects.
Woodland structure: veteran trees (number per hectare)	No decline.			
Woodland structure: indicators of local distinctiveness (occurrence; population size)	No decline in distribution and, in the case of Red Listed and other rare or localised species, population size.			
Woodland structure: indicators of overgrazing (occurrence)	All five indicators of overgrazing absent.			
Vegetation composition: native tree cover (percentage)	No decline. Native tree cover at least 90% of canopy; target species cover at least 50% of canopy.	No The Proposed Project would not have any adverse effect on the integrity of the Charleville Wood SAC, having regard to its conservation objectives to restore vegetation composition, including native tree cover, typical species, negative indicator species, or problematic native species.	No	No potential for effects.
Vegetation composition: typical species (occurrence)	At least one target species for 91E0* woodlands present; at least six positive indicator species for 91E0* woodlands present.			
Vegetation composition: negative indicator species (occurrence)	Negative indicator species cover not greater than 10%; regeneration of negative indicator species absent.			
Vegetation composition: problematic native species (percentage)	Cover of common nettle (*Urtica dioica*) less than 75%.			

Attributes and Measures	**Target**	**Potential Impacts Requiring Mitigation?**	**Are Mitigation Measures Required?**	**Conclusion**
Desmoulin's Whorl Snail (*Vertigo moulinsiana*) [1016] **To maintain or restore the favourable conservation condition of the species in Charleville Wood SAC, which is defined by the following list of attributes and targets:**				
Distribution: occupied 1km squares (number)	No decline, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the wetland habitats supporting *Vertigo moulinsiana* in Charleville Wood SAC such that individuals are killed and/or the affected habitat becomes unsuitable for occupation (at least temporarily). This could affect the number of occupied sites in the SAC, the number of adult snails present in affected areas, the area of suitable habitat, or the quality of suitable habitat across the site.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on wetland habitats in Charleville Wood SAC are avoided (Section 7.7.4).	No potential for effects, following the implementation of mitigation measures.
Occurrence in suitable habitat (percentage of positive records)	No decline, subject to natural processes. A baseline figure of 50% positive samples is set.			
Density within habitat (number of adults per sample)	No decline, subject to natural processes; at least 67% of samples should have more than 20 individuals.			
Habitat area (hectares)	Area of suitable habitat stable or increasing, subject to natural processes; no less than 5ha of at least sub-optimal habitat.			
Habitat quality: water levels (hydrological regime)	Maintain at current levels, subject to natural processes.			
Tree canopy extent (percentage)	Tree canopy cover around lake stable at current levels, subject to natural processes.	No The Proposed Project boundary is 5.1km directly away from the SAC site boundary and poses no risk of affecting tree canopy extent in Charleville Wood SAC.	No	No potential for effects.

7.7.4 Design Requirements and Mitigation Measures

1182. The positioning of the infrastructure associated with the Proposed Project has been designed to avoid European sites, where possible, and to minimise the risks of indirect effects as far as is possible. The design measures are described in Section 3.5.

7.7.4.1 Construction Phase Mitigation

1183. The mitigation measures to protect water quality in the receiving environment during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example: the use of sandbags, silt curtains or similar barriers, buffers of natural uncleared vegetation, and suspension of works within and adjacent to watercourses during periods of heavy rainfall. Such mitigation measures are considered best practice and are in accordance with IFI (2016) guidelines.

1184. The mitigation measures to ensure that INNS are not spread or introduced to Charleville Wood SAC during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example, the thorough cleaning of plant and equipment using a power washer unit prior to leaving site, in accordance with the OPW Environmental Standard Operating Procedures (OPW 2011) and/or IFI Biosecurity Protocols (IFI 2010).

7.7.4.2 Operational Phase Mitigation

1185. The mitigation measures to protect water quality in the receiving environment during the Operational Phase are similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

1186. The mitigation measures to ensure that INNS are not spread or introduced to Charleville Wood SAC during the Operational Phase are also similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

7.7.5 Residual Impacts

1187. The Proposed Project has the potential to negatively affect water quality in the receiving surface water environment during the Construction Phase and the Operational Phase and, as watercourses crossed by the Proposed Project drain to the Clodiagh and Tullamore Rivers, there is the potential for the conservation objectives of Charleville Wood SAC to be negatively affected. Mitigation measures will be implemented to ensure that the receiving surface water network is protected, and the conservation objectives of Charleville Wood SAC are not negatively affected by the Proposed Project.

1188. The Proposed Project has the potential to spread and introduce INNS to Charleville Wood SAC via the catchment of the Clodiagh and Tullamore Rivers, which drains to Charleville Wood SAC. Mitigation measures will be implemented to ensure that any INNS present within the Construction Working Width or the 20m wide Permanent Wayleave are controlled and are not spread to Charleville Wood SAC, and that the conservation objectives of Charleville Wood SAC are not negatively affected by the Proposed Project.

1189. There are therefore, no residual direct or indirect impacts associated with the Proposed Project that could adversely affect the integrity of Charleville Wood SAC.

7.7.6 Conclusion of Assessment for Charleville Wood SAC 0571

1190. None of the potential direct or indirect impacts associated with the Proposed Project would affect the conservation objectives of any of the qualifying interest habitats or species of Charleville Wood SAC. Mitigation measures are included to ensure that water quality in the receiving surface water environment is protected and that INNS are not spread or introduced to Charleville Wood SAC.

1191. The examination, analysis and evaluation covered all relevant information in respect of the qualifying interest habitats and species of the SAC. This included the potential impacts, mitigation and prevention measures, and whether or not the predicted impacts would affect the conservation objectives that support the conservation condition for the qualifying interests concerned (either directly or indirectly; refer to Section 8 for the in-combination assessment). It has been concluded beyond reasonable scientific doubt that, subject to the implementation of mitigation measures, the Proposed Project would not adversely affect the integrity of Charleville Wood SAC.

7.8 River Boyne and River Blackwater SAC 2299

7.8.1 Qualifying Interests and Conservation Objectives of River Boyne and River Blackwater SAC 2299

1192. The qualifying interest Annex I habitats and species of the River Boyne and River Blackwater SAC, and the overall conservation objective for each, are listed in Table 7.24.

Table 7.24: Qualifying Interests and Conservation Objectives of River Boyne and River Blackwater SAC (NPWS 2021c)

Qualifying Interests	Conservation Objectives
Annex I Habitats	
Alkaline fens [7230]	To maintain favourable conservation condition
*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]	To restore favourable conservation condition
Annex II Species	
Lampetra fluviatilis (River lamprey) [1099]	To restore favourable conservation condition
Salmo salar (Salmon) (in fresh water) [1106]	
Lutra lutra (Otter) [1355]	To maintain favourable conservation condition

1193. In conjunction with considering the generic conservation objective, to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected, the available site-specific conservation objectives document for River Boyne and River Blackwater SAC (NPWS 2021c) also informed this assessment. This document sets out the attributes, measures and targets that define the favourable conservation condition of qualifying interest habitats and species within the European site.

7.8.2 Ecological Baseline Description for River Boyne and River Blackwater SAC 2299

1194. The River Boyne and Blackwater SAC comprises the Blackwater (as far as Lough Ramor), the River Boyne (the freshwater element as far as the Boyne Aqueduct) and the Boyne tributaries (including the Deel, Stoneyford and Tremblestown Rivers) (DAHG 2014b).

1195. The main areas of alkaline fen in this site are concentrated in the vicinity of Lough Shesk, Freehan Lough and Newtown Lough. The hummocky nature of the local terrain produces frequent springs and seepages which are rich in lime. A series of base-rich marshes have developed in the poorly drained hollows, generally linked with these three lakes. Open water is usually fringed by bulrush (*Typha latifolia*), common club-rush (*Schoenoplectus lacustris*) or common reed, and this last species also extends

shorewards where a dense stand of great fen-sedge frequently occurs. This in turn grades into a sedge and grass community (*Carex* spp.) and purple moor-grass, or one dominated by black bog-rush. An alternative aquatic/terrestrial transition is a floating layer of vegetation. This is normally based on bogbean (*Menyanthes trifoliata*) and marsh cinquefoil (*Potentilla palustris*). Other species gradually become established on this cover, especially plants tolerant of low nutrient status e.g. bog mosses (*Sphagnum* spp.). Diversity of plant and animal life is high in the fen and the flora includes many rarities. Plants of interest include narrow-leaved marsh-orchid (*Dactylorhiza traunsteineri*), fen bedstraw (*Galium uliginosum*), cowbane (*Cicuta virosa*), frogbit (*Hydrocharis morsus-ranae*) and least bur-reed (*Sparganium minimum*). These species tend to be restricted in their distribution in Ireland. Also notable is the abundance of aquatic stoneworts which are characteristic of calcareous wetlands (DAHG 2014b).

1196. The rare plant round-leaved wintergreen (*Pyrola rotundifolia*) occurs around Newtown Lough. This species is listed in the Red Data Book and this site represents its only occurrence in County Meath (DAHG 2014b).

1197. Wet woodland fringes many stretches of the Boyne. The Boyne River islands are a small chain of three islands situated 2.5km west of Drogheda. The islands were formed by the build-up of alluvial sediment in this part of the river where water movement is sluggish. All of the islands are covered by dense thickets of wet, willow (*Salix* spp.) woodland, with the following species occurring: osier, crack willow, white willow, purple willow (*Salix purpurea*) and rusty willow. A small area of alder woodland is found on soft ground at the edge of the canal in the north-western section of the islands. Along other stretches of the rivers of the site rusty willow scrub and pockets of wet woodland dominated by alder have become established, particularly at the river edge of mature deciduous woodland. Ash and downy birch are common in the latter, and the ground flora is typical of wet woodland with meadowsweet, wild angelica, yellow iris, horsetails (*Equisetum* spp.) and occasional tussocks of greater tussock-sedge (*Carex paniculata*) (DAHG 2014b).

1198. The dominant habitat along the edges of the river is freshwater marsh, and the following plant species occur commonly in these areas: yellow iris, creeping bent, canary reed-grass, marsh bedstraw (*Galium palustre*), water mint and water forget-me-not. In the wetter areas common meadow-rue (*Thalictrum flavum*) is found. In the vicinity of Dowth, fen bedstraw, a scarce species mainly confined to marshy areas in the Midlands, is common in this vegetation. Swamp meadow-grass (*Poa palustris*) is an introduced plant which has spread into the wild (naturalised) along the Boyne approximately 5km south-west of Slane. It is a rare species which is listed in the Red Data Book and has been recorded among freshwater marsh vegetation on the banks of the Boyne in this site. The only other record for this species in the Republic of Ireland is from a site in County Monaghan (DAHG 2014b).

1199. The secondary habitat associated with the marsh is wet grassland and species such as tall fescue (*Schedonorus arundinaceus*), silverweed (*Potentilla anserina*), creeping buttercup (*Ranunculus repens*), meadowsweet and meadow vetchling (*Lathyrus pratensis*) are well represented. Strawberry clover (*Trifolium fragiferum*), a plant generally restricted to coastal locations in Ireland, has been recorded from wet grassland vegetation at Trim. At Rossnaree riverbank on the River Boyne, round-fruited rush (*Juncus compressus*) is found in alluvial pasture, which is generally periodically flooded during the winter months. This rare plant is only found in three counties in Ireland. Other habitats present along the Boyne and Blackwater include lowland dry grassland, improved grassland, reedswamp, weedy waste ground, scrub, hedge, drainage ditch and canal (DAHG 2014b).

1200. Atlantic salmon use the tributaries and headwaters as spawning grounds. This site is also important for the populations of two other species listed on Annex II of the Habitats Directive which it supports, namely river lamprey, which is present in the lower reaches of the Boyne River, and otter, which can be found throughout the site (DAHG 2014b).

1201. Whooper swans winter regularly at several locations along the Boyne and Blackwater Rivers. Known sites are at Newgrange, near Slane, Wilkinstown and River Blackwater from Kells to Navan. The available information indicates that there is a regular wintering population of whooper swans based along the Boyne and Blackwater River valleys. The birds use a range of feeding sites, but roosting sites are not well known. The population is substantial, certainly of national, and at times international, importance (DAHG 2014b).

1202. The site supports populations of several species listed on Annex II of the Habitats Directive, and habitats listed on Annex I of this Directive, as well as examples of other important habitat types. Although the wet woodland areas appear small there are few similar examples of this type of alluvial wet woodland remaining in the country, particularly in the north-east. The semi-natural habitats, particularly the strips of woodland which extend along the riverbanks, and the marsh and wet grasslands, increase the overall habitat diversity and add to the ecological value of the site, as does the presence of a range of Red Data Book plant and animal species and the presence of nationally rare plant species (DAHG 2014b).

1203. The Proposed Project boundary is located 13.1km south of the River Boyne and River Blackwater SAC boundary and does not overlap with this European site. Due to the low/moderate permeability and poor storage capacity, the underlying aquifers have low and relatively short flow paths and discharge to nearby streams. The hydrogeological ZoI of the Proposed Project does not extend to 13.1km and poses no risk of hydrogeological effects within the River Boyne and River Blackwater SAC. However, the Proposed Project does cross watercourses in the Blackwater [Longwood] River catchment that drain to the River Boyne and River Blackwater SAC more than 14km away (refer to Appendix J: Watercourse Crossings and Pathways to European Sites, for more details and EIAR Figure 8.4 to Figure 8.108 for the locations of the watercourse crossings).

7.8.3 Examination and Analysis of Potential Direct and Indirect Impacts

1204. As the Proposed Project does not overlap with the River Boyne and River Blackwater SAC, none of the qualifying interest habitats or species would be directly impacted. The River Boyne and River Blackwater SAC (and potential ex-situ sites) also lies beyond the ZoI of any hydrogeological, air quality or disturbance/displacement impacts.

1205. However, in the absence of mitigation measures, the Proposed Project's indirect impacts described in the following sections could potentially affect the conservation objective attributes and targets supporting the conservation condition of the qualifying interests of the River Boyne and River Blackwater SAC.

7.8.3.1 Construction Phase

7.8.3.1.1 Habitat Degradation as a Result of Excavation and Tunnelling

1206. The only influence tunnelling or excavation works associated with the Proposed Project could have on the River Boyne and River Blackwater SAC is indirectly during the pipeline installation works at the watercourse crossings, where there is a risk of water quality impacts in the receiving watercourses regardless of whether open cut or trenchless techniques are used. This is discussed further below in the hydrological impacts section.

7.8.3.1.2 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1207. Hydrostatic pressure testing would be carried out on the Treated Water Pipelines. It is proposed to abstract water from eight water bodies along the route and use the abstracted 'test water' to pressure test the pipeline (Section 5.1.2.2). This water would then be discharged through the use of washouts to land or to water bodies, or tankered away where required. In addition, there are a total of 51 Line Valves along the pipeline route. Two of these are located on the RWRMs and the other 49 are located along the Treated Water Pipeline. The two Line Valves on the RWRMs would not have washouts. Twenty of the

49 Line Valves along the Treated Water Pipeline would have washouts. Washouts at Line Valves would only be used to discharge the sweetening flows during final filling in the Commissioning Phase and the washout design flow would vary between 1l/s and 4l/s. The water used to test the pipeline would be released via one of these 20 Line Valve Washouts. These are detailed in Annex A (Water Body Crossings and Washout Valves – Detailed Assessment) of EIAR Appendix A9.2 (Pipeline Assessment). Such activities in the ZoI of the River Boyne and River Blackwater SAC or its tributaries may affect water quality in the European site and has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats hydrologically linked to the European site. Mitigation measures are detailed in Section 7.1.4.3.

1208. As the Proposed Project crosses watercourses that drain to the Blackwater [Longwood] River catchment and the River Boyne and River Blackwater SAC, construction works at these watercourse crossings pose a risk of affecting water quality in the European site through increasing silt-sediment loading, accidental spillage of cement-based products, accidental spillage of hydrocarbons or through faecal contamination arising from on-site toilets and washing facilities.

1209. Affecting water quality in receiving watercourses and in the River Boyne and River Blackwater SAC has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats that interact with the River Boyne.

7.8.3.1.3 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1210. As the Proposed Project would involve instream construction works on watercourses that drain to the River Boyne and River Blackwater SAC, there is the potential that INNS could be introduced to the surface water network and establish populations downstream in the European site.

1211. Introducing INNS to the River Boyne and River Blackwater SAC has the potential to affect the conservation objectives supporting the conservation condition of some of the qualifying interest habitats.

7.8.3.1.4 Mortality risk

1212. As the Proposed Project would involve instream construction works on watercourses linked to the River Boyne and River Blackwater SAC, there is an increased risk during the Construction Phase of otter, river lamprey and Atlantic salmon being killed or injured from collisions with construction traffic/machinery or from construction materials accidentally falling into a water body.

1213. Otter, river lamprey and Atlantic salmon populations in the affected catchments may be linked to, and may support, the otter, river lamprey and Atlantic salmon populations in the River Boyne and River Blackwater SAC. Therefore, an increased mortality risk to otter, river lamprey and Atlantic salmon has the potential to affect the conservation objectives supporting the conservation condition of these species in the River Boyne and River Blackwater SAC.

7.8.3.1.5 Barrier effect

1214. The Blackwater (Longwood) River catchment would be crossed by the Proposed Project upstream of the River Boyne and River Blackwater SAC. The pipeline at the stream crossings would be installed using open cut techniques in second order streams, which would result in a temporary (ranging from one week up to one month in a worst-case scenario) barrier to Atlantic salmon and river lamprey movement in that catchment. Such a temporary effect would not result in any population level effects, but this is dependent on the affected section of river/stream channel being reinstated to its pre-works condition to maintain the hydrological structure and function and prevent any long-term barrier to fish movement within the catchment.

1215. Presenting a barrier to fish species movement could isolate important habitat that supports a critical life-cycle stage of Atlantic salmon or river lamprey (e.g. spawning grounds) which has the potential to affect the conservation objectives supporting the conservation condition of these species in the River Boyne and River Blackwater SAC.

7.8.3.2 Operational Phase

7.8.3.2.1 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1216. Although there would not be any routine discharges to the surface water network during the Operational Phase, Washout Valves would be located along the pipeline to facilitate planned repair and maintenance works (every 20-25 years). The water will be dechlorinated before discharge using dechlorination chemicals and there is therefore a risk to water quality in receiving watercourses from accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. Repair and maintenance works may require excavations to repair or replace sections of pipeline which pose a risk of affecting water quality in the surface water network.

1217. Affecting water quality in receiving watercourses and in the River Boyne and River Blackwater SAC has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats that interact with the River Boyne.

7.8.3.2.2 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1218. During the Operational Phase, repair and maintenance works may be required to sections of the pipeline within the Proposed Project, which cross watercourses that drain to the River Boyne and River Blackwater SAC. There is a risk that plant INNS may colonise lands within the 20m wide Permanent Wayleave post-construction and therefore, a risk that repair and maintenance works could potentially introduce INNS to the surface water network and establish populations downstream in the European site.

1219. Introducing INNS to the River Boyne and River Blackwater SAC has the potential to affect the conservation objectives supporting the conservation condition of some of the qualifying interest habitats.

7.8.3.3 Summary

1220. Table 7.25 presents a summary of the potential impacts on the qualifying interests of the River Boyne and River Blackwater SAC as a result of the Proposed Project and how these impacts affect the site's conservation objectives. Those highlighted in blue are the qualifying interests which are present within the ZoI of the Proposed Project that could potentially be impacted.

Table 7.25: Qualifying Interests of the River Boyne and River Blackwater SAC and Summary of Potential Impacts

Qualifying Interests	Potential Impacts	
	Construction Phase	Operational Phase
Annex I Habitats		
Alkaline fens [7230]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
Annex II Species		
Lampetra fluviatilis (River lamprey) [1099]	Habitat degradation – water quality impacts Mortality risk Barrier effect	Habitat degradation – water quality impacts
Salmo salar (Salmon) (in fresh water) [1106]	Habitat degradation – water quality impacts Mortality risk Barrier effect	Habitat degradation – water quality impacts
Lutra lutra (Otter) [1355]	Habitat degradation – water quality impacts Mortality risk Barrier effect	Habitat degradation – water quality impacts

1221. The specific attributes and targets used to define the conservation objectives of the qualifying interest habitats and species of the River Boyne and River Blackwater SAC are presented in Table 7.26, along with the potential impacts associated with the Proposed Project. Those qualifying interests, and the supporting attributes, measures, and targets at risk of being affected by the Proposed Project are highlighted in blue.

Table 7.26: Potential Impacts on the Conservation Objectives of the River Boyne and River Blackwater SAC

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Alkaline fens [7230] **To maintain the favourable conservation condition of the habitat in River Boyne and River Blackwater SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality downstream in the River Boyne and any associated alkaline fen habitat in the River Boyne and River Blackwater SAC. Although the River Boyne and River Blackwater SAC boundary is more than 14km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread via watercourses crossed by the Proposed Project, to alkaline fen habitat within the SAC. These impacts could negatively affect the area or the distribution of alkaline fen habitat in the River Boyne and River Blackwater SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in the River Boyne and River Blackwater SAC are avoided (Section 7.8.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Boyne and River Blackwater SAC (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.
Habitat distribution (occurrence)	No decline, subject to natural processes.			
Ecosystem function: soil nutrients (soil pH and appropriate nutrient levels at a representative number of monitoring stops)	Maintain soil pH and nutrient status within natural range.	No Although the Proposed Project lies upstream of the River Boyne and River Blackwater SAC, given the nature of the Proposed Project, it poses no risk of affecting nutrient levels, in particular the deposition of nitrogen, in receiving watercourses downstream or in alkaline fen habitat in the SAC.	No	No potential for effects.
Ecosystem function: peat formation (percentage cover of peat-forming vegetation and water table levels)	Maintain active peat formation, where appropriate.	No The Blackwater (Longwood) River catchment would be crossed by the Proposed Project upstream of the River Boyne and River Blackwater SAC. The pipeline at the stream crossings would be installed using open cut techniques and although there is a risk of temporary (ranging from one week up to one month in a worst-case scenario) changes to the hydrological regime in those watercourses during the Construction Phase, there is no significant long-term or permanent risk to the functioning of the hydrological regime of the River Boyne supporting alkaline fen habitat in the River Boyne and River Blackwater SAC.	No	No potential for effects.
Ecosystem function: hydrology - groundwater levels (water levels (centimetres); duration of levels; hydraulic gradients; water supply)	Maintain, or where necessary restore, appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Ecosystem function: hydrology - surface water flow (drain density and form)	Maintain, or where necessary restore, as close as possible to natural or semi-natural, drainage conditions.	No The Blackwater (Longwood) River catchment would be crossed by the Proposed Project upstream of the River Boyne and River Blackwater SAC. The pipeline at the stream crossings would be installed using open cut techniques and although there is a risk of temporary (ranging from one week up to one month in a worst-case scenario) changes to the hydrological regime in those watercourses during the Construction Phase, there is no significant long-term or permanent risk to the functioning of the hydrological regime of the River Boyne supporting alkaline fen habitat in the River Boyne and River Blackwater SAC.	No	No potential for effects.
Ecosystem function: water quality (various)	Maintain appropriate water quality, particularly nutrient levels, to support the natural structure and functioning of the habitat.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality in the Blackwater (Longwood) River catchment which drain to the River Boyne and River Blackwater SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in the River Boyne and River Blackwater SAC are avoided (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: community diversity (abundance of variety of vegetation) communities	Maintain variety of vegetation communities, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality downstream in the River Boyne and any associated alkaline fen habitat in the River Boyne and River Blackwater SAC. Although the River Boyne and River Blackwater SAC boundary is more than 14km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via watercourses crossed by the Proposed Project, to alkaline fen habitat within the SAC. These impacts could negatively affect the diversity of vegetation communities associated with alkaline fen habitat in the River Boyne and River Blackwater SAC, or vegetation composition and the abundance of positive brown moss indicator species or vascular plant positive indicator species, associated with alkaline fen habitat in the River Boyne and River Blackwater SAC. These impacts could also negatively affect the vegetation composition of alkaline fen habitat in the River Boyne and River Blackwater SAC and provide suitable conditions/opportunities for negative indicator species to establish.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in the River Boyne and River Blackwater SAC are avoided (Section 7.8.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Boyne and River Blackwater SAC (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: typical brown mosses (percentage cover at a representative number of monitoring stops)	Maintain adequate cover of typical brown moss species.			
Vegetation composition: typical vascular plants (percentage cover at a representative number of monitoring stops))	Maintain adequate cover of typical vascular plant species.			
Vegetation composition: native negative indicator species (percentage cover at a representative number of monitoring) stop	Cover of native negative indicator species at insignificant levels.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation composition: non-native species (percentage cover at a representative number of monitoring stops)	Cover of non-native species less than 1%.	Yes Although the River Boyne and River Blackwater SAC boundary is more than 14km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via watercourses crossed by the Proposed Project, to alkaline fen habitat within the SAC. This impact could negatively affect the vegetation composition of alkaline fen habitat in the River Boyne and River Blackwater SAC.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Boyne and River Blackwater SAC (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: native trees and shrubs (percentage cover in local vicinity of a representative number of monitoring stop)	Cover of scattered native trees and shrubs less than 10%.	No The Blackwater (Longwood) River catchment is the only potential impact pathway connecting the Proposed Project to alkaline fen habitat within the River Boyne and River Blackwater SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of increasing the cover of native trees and shrubs, or algal cover in alkaline fen habitat in the SAC (see above for discussion on negative indicator species and INNS).	No	No potential for effects.
Vegetation composition: algal cover (Percentage cover at, and in local vicinity of, a representative number of monitoring stops)	Cover of algae less than 2%.			
Vegetation structure: vegetation height (percentage cover at a representative number of monitoring stops)	At least 50% of the live leaves/flowering shoots are more than either 5cm or 15cm above ground surface depending on community type.	Yes Although the River Boyne and River Blackwater SAC boundary is more than 14km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk during the Construction Phase or the Operational Phase that INNS capable of colonising terrestrial or wetland habitats could be spread to the River Boyne, via the Blackwater (Longwood) River, to alkaline fen habitat within the SAC. This impact could negatively affect vegetation height in alkaline fen habitat in the River Boyne and River Blackwater SAC.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Boyne and River Blackwater SAC (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.
Physical structure: disturbed bare ground (percentage cover at, and in local vicinity of, a representative number of monitoring stops)	Cover of disturbed bare ground less than 10%.	No The Blackwater (Longwood) River catchment is the only potential impact pathway connecting the Proposed Project to alkaline fen habitat within the River Boyne and River Blackwater SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of increasing the percentage cover of disturbed bare ground.	No	No potential for effects.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Physical structure: tufa formations (percentage cover in local vicinity of a representative number of monitoring stops)	Disturbed proportion of vegetation cover where tufa is present is less than 1%.	No The Proposed Project boundary is 13.1km directly away from the River Boyne and River Blackwater SAC boundary and would not involve any works within the SAC that would result in drainage of alkaline fen habitat or that would disturb tufa formations or any vegetation associated with alkaline fen habitat.	No	No potential for effects.
Indicators of local distinctiveness (occurrence and population size)	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality downstream in the River Boyne and any associated alkaline fen habitat in the River Boyne and River Blackwater SAC. Although the River Boyne and River Blackwater SAC boundary is more than 14km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread via watercourses crossed by the Proposed Project, to alkaline fen habitat within the SAC. These impacts could negatively affect the vegetation composition, and the abundance of locally distinctive species, in alkaline fen habitat in the River Boyne and River Blackwater SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in the River Boyne and River Blackwater SAC are avoided (Section 7.8.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Boyne and River Blackwater SAC (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.
Transitional areas between fen and adjacent habitats (hectares; distribution)	Maintain adequate transitional areas to support/protect the alkaline fen ecosystem and the services it provides.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality downstream in the River Boyne and any associated alkaline fen habitat in the River Boyne and River Blackwater SAC. Although the River Boyne and River Blackwater SAC boundary is more than 14km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via watercourses crossed by the Proposed Project, to alkaline fen habitat within the SAC. These impacts could negatively affect the transitional areas between the alkaline fen and adjacent habitats in the River Boyne and River Blackwater SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in the River Boyne and River Blackwater SAC are avoided (Section 7.8.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Boyne and River Blackwater SAC (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
[91E0] *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) **To restore the favourable conservation condition of the habitat in the River Boyne and River Blackwater SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes.	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to alluvial forest habitat within the River Boyne and River Blackwater SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of affecting the numbers/ abundance of woodland tree species.	No	No potential for effects.
Habitat distribution (occurrence)	No decline, subject to natural processes.			
Woodland size (hectares)	Area stable or increasing. Where topographically possible, 'large' woods at least 25ha in size and 'small' woods at least 3ha in size.			
Woodland structure: indicators of local distinctiveness (occurrence)	No decline.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the sensitive woodland plant species where the habitat has a direct interaction with the River Boyne through seasonal flooding (some of which may be considered locally distinctive). Although unlikely, given the SAC boundary is more than 14km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial woodland habitats along the River Boyne could be spread to alluvial forest habitat in the SAC via the surface water network. Introducing plant INNS could negatively affect the number, abundance and diversity of any locally distinctive species.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Boyne and River Blackwater SAC are avoided (Section 7.8.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Boyne and River Blackwater SAC (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: native tree cover (percentage)	No decline. Native tree cover not less than 95%. Species reported in Perrin *et al.* (2008).	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to alluvial forest habitat within the River Boyne and River Blackwater SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of affecting the numbers/abundance/composition of woodland tree species.	No	No potential for effects.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation composition: typical species (occurrence)	A variety of typical native species present, depending on woodland type, including alder (*Alnus glutinosa*), willows (*Salix* spp) and, locally, oak (*Quercus robur*) and ash (*Fraxinus excelsior*). Species reported in Perrin *et al.* (2008).	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the sensitive native woodland plant species where the habitat has a direct interaction with the River Shannon through seasonal flooding. Although unlikely, given the SAC boundary is more than 14km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial woodland habitats along the River Boyne could be spread to alluvial forest habitat in the SAC via the surface water network. Introducing plant INNS could negatively affect the number, abundance and diversity of native woodland species.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Boyne and River Blackwater SAC are avoided (Section 7.8.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Boyne and River Blackwater SAC (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: negative indicator species (occurrence)	Negative indicator species, particularly non-native invasive species, absent or under control. The following are the most common invasive species in this woodland type: beech (*Fagus sylvatica*), sycamore (*Acer pseudoplatanus*), cherry laurel (*Prunus laurocerasus*), Himalayan balsam (*Impatiens glandulifera).*	Yes Although unlikely, given the SAC boundary is more than 14km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial woodland habitats along the River Boyne could be spread to alluvial forest habitat in the SAC via the surface water network.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Boyne and River Blackwater SAC (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.
River Lamprey (*Lampetra fluviatilis*) [1099] **To restore the favourable conservation condition of river lamprey in the River Boyne and River Blackwater SAC, which is defined by the following list of attributes and targets:**				
Distribution (percentage of river accessible)	Access to all watercourses down to first order streams.	Yes The Blackwater (Longwood) River catchment would be crossed by the Proposed Project upstream of the River Boyne and River Blackwater SAC. The pipeline at the stream crossings which would be installed using open cut techniques would result in a temporary (ranging from one week up to one month in a worst-case scenario) barrier effect to lamprey movement in that catchment. However, if not reinstated to the pre-works condition there is the potential for a significant long-term barrier to aquatic species movement in the affected catchment.	Yes Measures to reinstate the river channel to its pre-works condition and hydrological structure and function, would be implemented to ensure that the Proposed Project would not present a barrier to fish movement within the Blackwater (Longwood) River catchment and any related effects on aquatic qualifying interest species of the River Boyne and River Blackwater SAC are avoided (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Population structure of juveniles (number of age/size groups)	At least three age/size groups of brook/river lamprey present.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could have significant negative effects on the quality, extent and availability of any juvenile lamprey habitat present downstream of the Proposed Project which in turn could affect the population structure of the juvenile lamprey population or the density of juvenile lamprey present. An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could have significant negative impacts on lamprey spawning habitat downstream through silt smothering sand/gravel beds. Such impacts could affect the extent and distribution of spawning grounds or could influence the quality, extent and availability of any juvenile lamprey habitat present downstream of the Proposed Project. Juvenile lamprey habitat was noted to occur upstream of this SAC at watercourse crossings WCX061, WCX062 and WCX065 (Appendix J: Watercourse Crossings and Pathways to European Sites).	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Boyne and River Blackwater SAC are avoided (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.
Juvenile density in fine sediment (juveniles/m²)	Mean catchment juvenile density of brook/river lamprey at least 5/m².			
Extent and distribution of spawning habitat (m² and occurrence)	No decline in extent and distribution of spawning beds.			
Availability of juvenile habitat (number of positive sites in second order channels (and greater), downstream of spawning areas)	More than 50% of sample sites positive			
Mortality risk posed by construction works	Not defined in any existing conservation objectives document.	Yes The mortality risk posed to lamprey by construction works is related to both direct mortality, due to potential interaction with construction machinery/vehicles (especially the risk of injury when over pumping/fluming instream works areas), and/or indirect mortality, due to an accidental pollution event resulting in mortality through contaminant/toxin poisoning.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Boyne and River Blackwater SAC are avoided (Section 7.8.4). Measures would be implemented to ensure that construction works in, or in the ZoI of watercourses, do not result in the mortality of any aquatic qualifying interest species of the River Boyne and River Blackwater SAC (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Atlantic salmon (*Salmo salar*) (only in fresh water) [1106] **To maintain or restore the favourable conservation condition of Atlantic salmon in the River Boyne and River Blackwater SAC, which is defined by the following list of attributes and targets:**				
Distribution: extent of anadromy (percentage of river accessible)	100% of river channels down to second order accessible from estuary.	Yes The Blackwater (Longwood) River catchment would be crossed by the Proposed Project upstream of the River Boyne and River Blackwater SAC. The pipeline at the stream crossings, which would be installed using open cut techniques, would result in a temporary (ranging from one week up to one month in a worst-case scenario) and potentially adverse barrier effect to fish movement in that catchment. If not reinstated to the pre-works condition there is the potential for a long-term barrier to aquatic species movement in the affected catchment to have adverse effects on Atlantic salmon distribution.	Yes Measures to reinstate the river channel to its pre-works condition and hydrological structure and function, would be implemented to ensure that the Proposed Project would not present a barrier to fish movement within the Blackwater (Longwood) River catchment and that any related effects on aquatic qualifying interest species of the River Boyne and River Blackwater SAC are avoided (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.
Adult spawning fish (number)	Conservation Limit (CL) for each system consistently exceeded.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could have significant negative impacts on fish through silt smothering spawning grounds or affecting respiration, chemical contaminants physically damaging fish or causing mortality as a result of toxins. Such impacts could result in a reduction in fish numbers (adult or smolt) or a reduction in salmon fry abundance downstream, at least temporarily, with an increased risk of a population level effect if a pollution event were to occur in conjunction with fish migrating upstream from the sea to spawning grounds, or in conjunction with fish migrating downstream to the sea. An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could also have significant negative effects on redd counts through silt smothering spawning grounds downstream There was no potential spawning habitat recorded upstream of this SAC during aquatic surveys, however, potential habitat for adult/juvenile salmonids was noted in watercourse crossings WCX061, WCX062 and WCX065 (Appendix J: Watercourse Crossings and Pathways to European Sites).	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on the aquatic environment of the River Boyne and River Blackwater SAC are avoided (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.
Salmon fry abundance (number of fry/ five minutes electrofishing)	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/ five min sampling.			
Out-migrating smolt abundance (number)	No significant decline.			
Number and distribution of redds (number and occurrence)	No decline in number and distribution of spawning redds due to anthropogenic causes.			
Water quality (EPA Q value)	At least Q4 at all sites sampled by EPA.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could have significant negative impacts on water quality in receiving watercourses.		

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Mortality risk posed by construction works	Not defined in any existing conservation objectives document.	Yes The mortality risk posed to Atlantic salmon by construction works is related to both direct mortality, due to potential interaction with construction machinery/vehicles (especially the risk of injury when over pumping/fluming instream works areas), and/or indirect mortality, due to an accidental pollution event resulting in mortality through contaminant/toxin poisoning.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on the aquatic environment of the River Boyne and River Blackwater SAC are avoided (Section 7.8.4). Measures would be implemented to ensure that construction works in, or in the ZoI of watercourses, do not result in the mortality of any aquatic qualifying interest species of the River Boyne and River Blackwater SAC (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.
Otter (*Lutra lutra*) [1355] **To maintain or restore the favourable conservation condition of otter in the River Boyne and River Blackwater SAC, which is defined by the following list of attributes and targets:**				
Distribution (percentage positive survey sites)	No significant decline.	No As the Proposed Project boundary is 13.1km directly away from the SAC site boundary, it poses no risk of disturbing or displacing otter from habitat areas used within the SAC during the Construction Phase or the Operational Phase.	No	No potential for effects.
Extent of terrestrial habitat (hectares)	No significant decline. Area not currently mapped or calculated along riverbanks.	No As the Proposed Project would not have any direct impacts on habitats, or result in any habitat loss, within the SAC the extent of terrestrial habitat, river habitat, or lake habitat available to otter would not be affected.		
Extent of freshwater (river) habitat (kilometres)	No significant decline. Length not currently mapped or calculated.			
Extent of freshwater (lake) habitat (hectares)	No significant decline. Area not currently mapped or calculated.			
Couching sites and holts (number)	No significant decline.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could (at least temporarily) potentially have significant negative effects on usage of holt/couch sites available for otter in the SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater	No potential for effects, following the implementation

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Fish biomass available (kilograms)	No significant decline.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could have significant negative impacts on fish through silt smothering spawning grounds or affecting respiration, chemical contaminants physically damaging fish or causing mortality as a result of toxins. Such impacts could result in a reduction in fish numbers, at least temporarily.	environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Boyne and River Blackwater SAC are avoided (Section 7.8.4).	of mitigation measures.
Barriers to connectivity (number)	No significant increase.	No The watercourses crossed by the Proposed Project that drain to this SAC are more than 20km upstream of the SAC boundary and any temporary barrier effect posed by instream works during open cut pipeline installation would not affect usage of watercourses by otter within the SAC as they are a highly mobile species and are not confined to the river channel to move within the catchment.	No	No potential for effects.
Mortality risk posed by construction works	Not defined in any existing conservation objectives document.	Yes The mortality risk posed to otter by construction works is related to both direct mortality, due to potential interaction with construction machinery/vehicles (especially the risk of holt damage/collapse), and/or indirect mortality, due to an accidental pollution event resulting in mortality through contaminant/toxin poisoning. Although the SAC boundary is more than 14km from where the Proposed Project crosses watercourses that drain to this SAC, otters can have home ranges extending over tens of kilometres and there is the potential that otters using watercourses hydrologically linked to the SAC form part of, or are linked to, the qualifying interest otter population of the River Boyne and River Blackwater SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Boyne and River Blackwater SAC are avoided (Section 7.8.4). Although no otter holts or couch sites are directly impacted by the Proposed Project, there is the potential that new holts/couch sites would be created at watercourse crossings before construction commences. Therefore, pre-construction surveys would be undertaken to identify any changes in holt/couch locations and, if present and impacted by construction works, to ensure they are protected and/or removed whilst avoiding any direct impacts to otter (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.

7.8.4 Design Requirements and Mitigation Measures

1222. The positioning of the infrastructure associated with the Proposed Project has been designed to avoid European sites, where possible, and to minimise the risks of indirect effects as far as is possible. The design measures are described in Section 3.5.

7.8.4.1 Construction Phase Mitigation

1223. The mitigation measures to protect water quality in the receiving environment during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example: the use of sandbags, silt curtains or similar barriers, buffers of natural uncleared vegetation, and suspension of works within and adjacent to watercourses during periods of heavy rainfall. Such mitigation measures are considered best practice and are in accordance with IFI (2016) guidelines.

1224. The mitigation measures to ensure that INNS are not spread or introduced to the River Boyne and River Blackwater SAC during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example, the thorough cleaning of plant and equipment using a power washer unit prior to leaving site, in accordance with the OPW Environmental Standard Operating Procedures (OPW 2011) and/or IFI Biosecurity Protocols (IFI 2010).

1225. The mitigation measures to ensure that aquatic species are not killed during the Construction Phase as a result of construction activities, or through water quality impacts, are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include that no machinery will operate in-stream. If watercourses have to be traversed during construction these will be bridged prior to commencement of works.

1226. The mitigation measures to ensure that in-stream works do not pose a long-term barrier to fish species movement within the Blackwater [Longwood] River catchment, are the same as those detailed in Section 7.1.4 for the Lower River Shannon catchment and in the CEMP (see EIAR Appendix A5.1).

7.8.4.2 Operational Phase Mitigation

1227. The mitigation measures to protect water quality in the receiving environment during the Operational Phase are similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

1228. The mitigation measures to ensure that INNS are not spread or introduced to the River Boyne and River Blackwater SAC during the Operational Phase are also similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

7.8.5 Residual Impacts

1229. The Proposed Project has the potential to negatively affect water quality in the receiving surface water environment during the Construction Phase and the Operational Phase and, as watercourses crossed by the Proposed Project drain to the River Boyne, there is the potential for the conservation objectives of the River Boyne and River Blackwater SAC to be negatively affected. Mitigation measures will be implemented to ensure that the receiving surface water network is protected and the conservation objectives of the River Boyne and River Blackwater SAC are not negatively affected by the Proposed Project.

1230. The Proposed Project has the potential to spread and introduce INNS to the River Boyne and River Blackwater SAC via the Blackwater [Longwood] River, which drains to the River Boyne and the River Boyne and River Blackwater SAC. Mitigation measures will be implemented to ensure that any INNS present within the Construction Working Width or the 20m wide Permanent Wayleave are controlled and are not spread to the River Boyne and River Blackwater SAC, and that the conservation objectives of the River Boyne and River Blackwater SAC are not negatively affected by the Proposed Project.

1231. The Proposed Project has the potential to result in the mortality of otter, river lamprey and Atlantic salmon during the Construction Phase which may potentially affect the otter, river lamprey and Atlantic salmon populations of the River Boyne and River Blackwater SAC. Mitigation measures will be implemented to ensure that protected fauna are not killed as a result of construction works, or as a result of a reduction in water quality in receiving water bodies, and that the conservation objectives of the River Boyne and River Blackwater SAC that support the qualifying interest populations are not negatively affected by the Proposed Project.

1232. The Proposed Project has the potential to result in a long-term barrier to river lamprey and Atlantic salmon movement within the Blackwater [Longwood] River catchment which is linked to the River Boyne and River Blackwater SAC and may support the qualifying interest populations of the SAC. Mitigation measures will be implemented to ensure that post construction, the reinstatement of river/stream channels after in-stream works would not present a barrier to fish species movement, and that the conservation objectives of the River Boyne and River Blackwater SAC that support the qualifying interest river lamprey and Atlantic salmon populations are not negatively affected by the Proposed Project.

1233. There are, therefore, no residual direct or indirect impacts associated with the Proposed Project that could adversely affect the integrity of the River Boyne and River Blackwater SAC.

7.8.6 Conclusion of Assessment for River Boyne and River Blackwater SAC 2299

1234. None of the potential direct or indirect impacts associated with the Proposed Project would affect the conservation objectives of any of the qualifying interest habitats or species of the River Boyne and River Blackwater SAC. Mitigation measures are included to ensure that water quality in the receiving surface water environment is protected, and that INNS are not spread or introduced to the River Boyne and River Blackwater SAC during the Construction Phase or Operational Phase, that otter, river lamprey and Atlantic salmon are not killed during the Construction Phase, and that post construction, there are no restrictions to fish species movements within catchments crossed by the Proposed Project.

1235. The examination, analysis and evaluation covered all relevant information in respect of the qualifying interest habitats and species of the SAC. This included the potential impacts, mitigation and prevention measures, and whether or not the predicted impacts would affect the conservation objectives that support the conservation condition for the qualifying interests concerned (either directly or indirectly; refer to Section 8 for the in-combination assessment). It has been concluded beyond reasonable scientific doubt that, subject to the implementation of mitigation measures, the Proposed Project would not adversely affect the integrity of River Boyne and River Blackwater SAC.

7.9 River Shannon Callows SAC 0216

7.9.1 Qualifying Interests and Conservation Objectives of River Shannon Callows SAC 0216

1236. The qualifying interest Annex I habitats and species of the River Shannon Callows SAC, and the overall conservation objective for each, are listed in Table 7.27.

Table 7.27: Qualifying Interests and Conservation Objectives of River Shannon Callows SAC (NPWS 2022a)

Qualifying Interests	Conservation Objectives
Annex I Habitats	
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410]	To restore favourable conservation condition
Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) [6510]	To restore favourable conservation condition
Alkaline fens [7230]	To maintain favourable conservation condition
*Limestone pavements [8240]	To maintain favourable conservation condition
*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]	To maintain favourable conservation condition
Annex II Species	
Otter - *Lutra lutra* [1355]	To maintain favourable conservation condition

1237. In conjunction with considering the generic conservation objective, to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected, the available site-specific conservation objectives document for River Shannon Callows SAC (NPWS 2022a) also informed this assessment. This document sets out the attributes, measures and targets that define the favourable conservation condition of qualifying interest habitats and species within the European site.

7.9.2 Ecological Baseline Description for River Shannon Callows SAC 0216

1238. The River Shannon Callows SAC consists of seasonally flooded, semi-natural, lowland wet grassland, along and beside the river between the towns of Athlone and Portumna. It is approximately 50km long and averages about 0.75km wide (reaching 1.5km wide in places). Along much of its length the site is bordered by raised bogs, esker ridges and limestone-bedrock hills. The Annex I habitats *Molinia* meadows [6410] and lowland hay meadows [6510] are well-represented within the site, alluvial forest [91E0] occurs on a series of alluvial islands just below the weir near Meelick and at Clorhane, an area of limestone pavement [*8240] represents the only known example in County Offaly. The site also supports a population of otter (DHLGH 2020).

1239. The River Shannon Callows is mainly composed of lowland wet grassland. Different plant communities occur, depending on elevation, and therefore flooding patterns. Two habitats listed on Annex I of the E.U. Habitats Directive are well-represented within the site – *Molinia* meadows and lowland hay meadows. The former is characterised by the presence of the meadow thistle *(Cirsium dissectum*) and purple moor-grass, while typical species in the latter include meadow fescue (*Lolium pratense*), rough meadow-grass *(Poa trivialis*), downy oat-grass (*Avenula pubescens*), common knapweed (*Centaurea nigra*), ribwort plantain (*Plantago lanceolata*) and common sorrel (*Rumex acetosa*). In places these two habitats grade into one another (DHLGH 2020).

1240. Low-lying areas of the callows with more prolonged flooding are characterised by floating sweet-grass *(Glyceria fluitans*), marsh foxtail (*Alopecurus geniculatus*) and wetland herbs such as yellow-cress (*Rorippa spp.*), water forget-me-not and common spike-rush (*Eleocharis palustris*). Most of the callows consist of a plant community characterised by creeping bent, brown sedge (*Carex disticha*), common sedge *(Carex nigra*), and herbs such as marsh marigold (*Caltha palustris)* and marsh bedstraw, while the more elevated and peaty areas are characterised by low-growing sedges, particularly yellow sedge (*Carex flava agg.*) and star sedge (*Carex echinata*). All these communities are very diverse in their total number of plant species and include the scarce species meadow-rue (*Thalictrum flavum),* summer snowflake (*Leucojum aestivum*) and marsh stitchwort (*Stellaria palustris*) (DHLGH 2020).

1241. A further two Annex I habitats, both listed with priority status, have a minor though important presence within the site. Alluvial forest occurs on a series of alluvial islands just below the weir near Meelick. Several of the islands are dominated by well-grown woodland consisting mainly of ash and willows (*Salix* spp.). The islands are prone to regular flooding from the river (DHLGH 2020).

1242. At Clorhane, an area of limestone pavement represents the only known example in Co. Offaly. It is predominantly colonised by mature hazel woodland, with areas of open limestone and calcareous grassland interspersed. The open limestone pavement comprises bare or moss-covered rock, or rock with a very thin calcareous soil cover supporting a short grassy turf. The most notable plant in the grassy area is a substantial population of green-winged orchid (*Orchis morio),* which occurs with such species as sweet vernal-grass (*Anthoxanthum odoratum*), quaking-grass (*Briza media),* sedges (*Carex caryophyllea, C. flacca*), common bird's foot-trefoil *(Lotus corniculatus*), common knapweed*,* and ribwort plantain*.* Ferns associated with the cracks in the pavement include *Asplenium trichomanes, A. ruta-muraria, A. adiantum-nigrum and Polypodium australe.* Bryophytes include *Grimmia apocarpa and Orthotrichum cf. anomalum.* Anthills are common within the open grassland. The hazel wood is well-developed and has herbaceous species such as primrose (*Primula vulgaris*), common dog-violet*,* wood-sorrel and herb-robert (*Geranium robertianum*). The wood is noted for its luxuriant growth of epiphytic mosses and liverworts, with such species as *Neckera crispa* and *Hylocomium brevirostre.* Yew occurs in one area (DHLGH 2020).

1243. Other habitats of smaller area but also of importance within the site are lowland dry grassland, drainage ditches, freshwater marshes and reedbeds. The dry grassland areas, especially where they exist within hay meadows, are species-rich, and of two main types: calcareous grassland on glacial material, and dry grassland on levees of river alluvium. The former can contain many orchid species, cowslip (*Primula veris),* abundant adder's-tongue (*Ophioglossum vulgatum)* and spring-sedge (*Carex caryophyllea),* and both contain an unusually wide variety of grasses, including false oat-grass (*Arrhenatherum elatius),* yellow oat-grass (*Trisetum flavescens),* meadow foxtail (*Alopecurus pratense),* and meadow brome *(Bromus commutatus).* In places summer snowflake also occurs (DHLGH 2020).

1244. Good quality habitats on the edge of the callows included in the site are wet broadleaved semi-natural woodland dominated by both downy birch and alder*,* and dry broadleaved woodland dominated by hazel. There are also areas of raised bog, fen on old cut-away bog with black bogrush*,* and a 'petrifying stream' with associated species-rich calcareous flush which supports long-stalked yellow sedge (*Carex lepidocarpa),* blunt-flowered rush *(Juncus subnodulosus)* and stoneworts (*Chara spp.)* (DHLGH 2020)*.*

1245. Immediately south of Portumna Bridge and south-east of the town of Portumna the area of low-lying terrestrial land west of the river comprises a large area of the Annex I habitat alkaline fen. The fen comprises a complex of rich-fen plant communities. Sedges *(Carex lasiocarpa, Carex acutiformis*) and bogbean dominate parts of the fens while other small sedges are common throughout. The orchids marsh helleborine (*Epipactis palustris*), early marsh orchid *(Dactylorhiza incarnata),* western marsh orchid *(D. majalis)* and the red-listed plant species marsh pea have been recorded within the fen (DHLGH 2020).

1246. Two species which are legally protected under the Flora (Protection) Order, 2022, occur in the site: opposite-leaved pondweed in drainage ditches, and meadow barley on dry alluvial grassland. This is one of only two known inland sites for meadow barley in Ireland. The Red Data Book plant green-winged orchid is known from dry calcareous grasslands within the site (DHLGH 2020).

1247. The site is of international importance for wintering waterfowl as numbers regularly exceed the 20,000 threshold (mean of 34,985 for five winters 1994/94-1998/99). Of particular note is an internationally important population of whooper swan (287). A further five species have populations of national importance (all figures are means for five winters 1995/96-1999/00): mute swan (349), wigeon (2,972), golden plover (4,254), lapwing (11,578) and black-tailed godwit (388). Species which occur in numbers

of regional or local importance include Bewick's swan, tufted duck, dunlin, curlew and redshank. The population of dunlin is notable as it is one of the few regular inland flocks in Ireland. Small flocks of Greenland white-fronted goose use the River Shannon Callows SAC; these are generally associated with larger flocks which occur on the adjacent Little Brosna Callows and River Suck Callows (DHLGH 2020a).

1248. Shoveler (an estimated 12 pairs in 1987) and black-tailed godwit (Icelandic race) (*Limosa limosa islandica*) (one or two pairs in 1987) breed within this site. These species are listed in the Red Data Book as being threatened in Ireland. The scarce bird quail (*Coturnix coturnix*) is also known to breed within the area. The callows has at times held over 40% of the Irish population of the globally endangered corncrake, although numbers have declined in recent years. A total of 66 calling birds were recorded in 1999, but numbers have dropped significantly since then. The total population of breeding waders (lapwing, redshank, snipe and curlew) in 1987 was one of three major concentrations in Ireland and Britain. The population of breeding redshank in the site was estimated to be 10% of the Irish population, making it nationally significant. Also, the Annex I species merlin and hen harrier are regularly reported hunting over the callows during the breeding season and in autumn and winter (DHLGH 2020).

1249. This site holds a population of otter, a species listed on Annex II of the E.U. Habitats Directive, while the Irish hare, which is listed in the Irish Red Data Book, is a common sight on the callows (DHLGH 2020).

1250. The River Shannon Callows SAC are used for summer dry-stock grazing (mostly cattle, with some sheep and a few horses), and permanent hay meadow. About 30ha is a nature reserve owned by voluntary conservation bodies. The River Shannon is used increasingly for recreational purposes with coarse angling and boating accounting for much of the visitor numbers. Intermittent and scattered damage to the habitats has occurred due to over-deepening of drains and peat silt deposition, water-skiing, ploughing and neglect of hay meadow (or reversion to pasture). However, none of these damaging activities can yet be said to be having a serious impact. Threats to the quality of the site may come from the siting of boating marinas in areas away from centres of population, fertilising of botanically-rich fields, the use of herbicides, reversion of hay meadow to pasture, neglect of pasture and hay meadow, disturbance of birds by boaters, anglers, birdwatchers and the general tourist. The maintenance of generally high water levels in winter and spring benefits all aspects of the flora and fauna, but in this regard, summer flooding is a threat to breeding birds and may cause neglect of farming (DHLGH 2020).

1251. The River Shannon Callows SAC has by far the largest area of lowland semi-natural grassland and associated aquatic habitats in Ireland, and one in which there is least disturbance of natural wetland processes. Botanically, it is extremely diverse with two legally protected species of plants and many scarce species. Excellent examples of two habitats listed on Annex I of the E.U. Habitats Directive occur within the site – *Molinia* meadows and lowland hay meadows with good examples of a further three Annex I habitats (two with priority status). In winter the site is internationally important for numbers and species of waterfowl. In spring it feeds large numbers of birds on migration, and in summer it holds very large numbers of breeding waders, rare breeding birds and the endangered corncrake, as well as a very wide variety of more common grassland and wetland birds. The presence of otter, an Annex II species, adds further importance to the site (DHLGH 2020).

1252. The Proposed Project boundary is located 14.7km south-east of the River Shannon Callows SAC boundary and does not overlap with this European site. Due to the low/moderate permeability and poor storage capacity, the underlying aquifers have a low and relatively short flow paths and discharge to nearby streams. The hydrogeological ZoI of the Proposed Project does not extend to 14.7km and poses no risk of hydrogeological effects within the River Shannon Callows SAC. However, the Proposed Project crosses watercourses that drain to the River Shannon Callows SAC more than 17km away (refer to Appendix J: Watercourse Crossings and Pathways to European Sites, for more details and EIAR Figure 8.4 to Figure 8.108 for the locations of the watercourse crossings). Evidence of otter activity was recorded at one of these watercourse crossings (WCX036).

7.9.3 Examination and Analysis of Potential Direct and Indirect Impacts

1253. As the Proposed Project does not overlap with the River Shannon Callows SAC, none of the qualifying interest habitats or species would be directly impacted. The River Shannon Callows SAC (and potential ex-situ sites) also lies beyond the ZoI of any hydrogeological, air quality or disturbance/displacement impacts.

1254. However, in the absence of mitigation measures, the Proposed Project's indirect impacts described in the following sections could potentially affect the conservation objective attributes and targets supporting the conservation condition of the qualifying interests of the River Shannon Callows SAC.

7.9.3.1 Construction Phase

7.9.3.1.1 Habitat Degradation as a Result of Excavation and Tunnelling

1255. The only influence tunnelling or excavation works associated with the Proposed Project could have on the River Shannon Callows SAC is indirectly during the pipeline installation works at the watercourse crossings, where there is a risk of water quality impacts in the receiving watercourses regardless of whether open cut or trenchless techniques are used. This is discussed further below in the hydrological impacts section.

7.9.3.1.2 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1256. Hydrostatic pressure testing would be carried out on the Treated Water Pipelines. It is proposed to abstract water from eight water bodies along the route and use the abstracted 'test water' to pressure test the pipeline (Section 5.1.2.2). This water would then be discharged through the use of washouts to land or to water bodies, or tankered away where required. In addition, there are a total of 51 Line Valves along the pipeline route. Two of these are located on the RWRMs and the other 49 are located along the Treated Water Pipeline. The two Line Valves on the RWRMs would not have washouts. Twenty of the 49 Line Valves along the Treated Water Pipeline would have washouts. Washouts at Line Valves would only be used to discharge the sweetening flows during final filling in the Commissioning Phase and the washout design flow would vary between 1l/s and 4l/s. The water used to test the pipeline would be released via one of these 20 Line Valve Washouts. These are detailed in Annex A (Water Body Crossings and Washout Valves – Detailed Assessment) of EIAR Appendix A9.2 (Pipeline Assessment). Such activities in the ZoI of the River Shannon Callows SAC or its tributaries may affect water quality in the European site and has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats hydrologically linked to the European site. Mitigation measures are detailed in Section 7.1.4.3.

1257. As the Proposed Project crosses watercourses that drain to the River Shannon and the River Shannon Callows SAC, construction works at these watercourse crossings pose a risk of affecting water quality in the European site through increasing silt-sediment loading, accidental spillage of cement-based products, accidental spillage of hydrocarbons or through faecal contamination arising from on-site toilets and washing facilities.

1258. Affecting water quality in receiving watercourses and in the River Shannon Callows SAC has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats that interact with the River Shannon.

7.9.3.1.3 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1259. As the Proposed Project would involve instream construction works on watercourses that drain to the River Shannon Callows SAC, there is the potential that INNS could be introduced to the surface water network and establish populations downstream in the European site.

1260. Introducing INNS to the River Shannon Callows SAC has the potential to affect the conservation objectives supporting the conservation condition of some of the qualifying interest habitats.

7.9.3.1.4 Mortality Risk

1261. As the Proposed Project would involve instream construction works on watercourses linked to Shannon Callows SAC, there is an increased risk during the Construction Phase of otter being killed or injured from collisions with construction traffic/machinery or from construction materials accidentally falling into a water body.

1262. Otter populations in the affected catchments may be linked to, and may support, the otter population in Shannon Callows SAC. Therefore, an increased mortality risk to otter has the potential to affect the conservation objectives supporting the conservation condition of otter in Shannon Callows SAC.

7.9.3.2 Operational Phase

7.9.3.2.1 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1263. River Shannon Callows SAC lies upstream of the abstraction point. The only possible mechanism of potential impact is the potential impact on water levels arising from the abstraction approximately 36km downstream (as the crow flies) at Parteen Basin, and the magnitude and distribution in time of these variations.

1264. It must be understood that the water level on Lough Derg and the River Shannon system as far upstream as Meelick Weir, at present is highly artificial in that it is managed year-round, primarily for hydropower, secondarily for navigation and in a collateral way to attenuate flooding insofar as possible. The only outflows are the compensation water (i.e. the minimum statutory compensation water flow of 10m^3/s directed to the Old River Shannon at Parteen Weir), and the flow through Ardnacrusha. The latter is driven by the daily and weekly power requirements of the national grid.

1265. The shoreline flora and fauna have, over many decades, come into equilibrium with the water level regime corresponding to this control. As previously mentioned, since the late 1970s, and arising from considerations of embankment safety, ESB has operated a 460mm deep Normal Operating Band on Lough Derg, and water level has been consistently managed to remain within this band, except where periods of flooding cause its upper limit to be exceeded.

1266. In assessing these, the following should be borne in mind:

- ESB normally manages the Normal Operating Band to be near full in late spring, before the onset of summer conditions, and to be at the lower end in autumn, in anticipation of incoming wet weather flows
- Even in a drought year such as 2018, the lowest recorded levels were in April and December, and not at all in the summer months. These lowermost levels, recorded naturally, pre-abstraction, were substantially the same as the model predicted levels post abstraction in August 2018 (EIAR Appendix 9.1, of Chapter 9: Water)
- Natural daily water level difference, across Lough Derg from north to south, due to wind effects and flow gradient, averaged 110mm (from the period 10 June 2018 to 31 August 2019), had a standard deviation of 60mm, had a minimum of 10mm and can exceed 400mm in storm events.

1267. The impacts to Lough Derg (and Parteen Basin) Lake levels (which are part of the same system as the River Shannon Callows SAC), due to the modelled inclusion of the Proposed Project abstraction (as a constant flow of either 154Mld or 300Mld) are barely distinguishable from the baseline case when viewed on level/flow duration curves (a standard hydrological method for comparing long-term data series). The level regimes of Lough Derg (and Parteen Basin) are only simulated to be affected by the Proposed

Project abstraction during extreme drought periods and in the days immediately after the drought (up to a week) when inflow is needed to replenish any deficit in storage caused by the Proposed Project abstraction. From the 52-year period model simulation period (1972-2023), the simulated Lake levels are only found to be notably affected by the inclusion of the Proposed Project during the 1995 and 2018 drought events, with all other years showing no perceptible impacts. Therefore, for approximately 99% of the 52-year model simulation period, there are no perceptible impacts to simulated Lake levels as a result of the Proposed Project abstraction. Even during the worst modelled drought event (2018) from the 52-year model simulation period, the size and rate of simulated Lake level change fits within the range of ESB normal observed Lake level fluctuations seen within the historical recorded levels and are still within the Normal Operating Band on Lough Derg and the upper and lower water level that ESB applies to Parteen Basin.

1268. When it is recalled that these are modelling results assuming the historic recorded generation pattern is unchanged, the barely distinguishable change from the baseline would, from the viewpoint of littoral vegetation, be indistinguishable from the range of difference attributable to wind effects alone.

1269. Although there would not be any routine discharges to the surface water network during the Operational Phase, Washout Valves would be located along the pipeline to facilitate planned repair and maintenance works (every 20-25 years). The water will be dechlorinated before discharge using dechlorination chemicals and there is therefore a risk to water quality in receiving watercourses from accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. Repair and maintenance works may require excavations to repair or replace sections of pipeline which pose a risk of affecting water quality in the surface water network. Affecting water quality in receiving watercourses and in the River Shannon Callows SAC has the potential to affect the conservation objectives supporting the conservation condition of qualifying interest species and habitats that interact with the River Shannon Callows SAC.

7.9.3.2.2 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1270. During the Operational Phase, repair and maintenance works may be required to sections of the pipeline within the Proposed Project, which cross watercourses that drain to the River Shannon Callows SAC. There is a risk that plant INNS may colonise lands within the 20m wide Permanent Wayleave post-construction and therefore, a risk that repair and maintenance works could potentially introduce INNS to the surface water network and establish populations downstream in the European site.

1271. Introducing INNS to the River Shannon Callows SAC has the potential to affect the conservation objectives supporting the conservation condition of some of the qualifying interest habitats.

7.9.3.3 Summary

1272. Table 7.28 presents a summary of the potential impacts on the qualifying interests of the River Shannon Callows SAC as a result of the Proposed Project and how these impacts affect the site's conservation objectives. Those highlighted in blue are the qualifying interests which are present within the ZoI of the Proposed Project that could potentially be impacted.

Table 7.28: Qualifying Interests of the River Shannon Callows SAC and Summary of Potential Impacts

Qualifying Interests	Potential Impacts	
	Construction Phase	Operational Phase
Annex I Habitats		
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) [6510]	No potential impact pathway	
Alkaline fens [7230]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
*Limestone pavements [8240]	No potential impact pathway	
*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
Annex II Species		
Otter - *Lutra lutra* [1355]	Habitat degradation – water quality impacts Mortality risk	Habitat degradation – water quality

1273. The specific attributes and targets used to define the conservation objectives of the qualifying interest habitats and species of the River Shannon Callows SAC are presented in Table 7.29, along with the potential impacts associated with the Proposed Project. Those qualifying interests, and the supporting attributes, measures, and targets at risk of being affected by the Proposed Project are highlighted in blue.

Table 7.29: Potential Impacts on the Conservation Objectives of the River Shannon Callows SAC

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
[6410] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) **To restore the favourable conservation condition of the habitat in the River Shannon Callows SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could potentially have significant negative effects on the area and distribution of wet grassland *Molinia* meadows in the SAC, where the habitat has a direct interaction with the River Shannon through seasonal flooding.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Shannon Callows SAC are avoided (Section 7.9.4).	No potential for effects, following the implementation of mitigation measures.
Habitat distribution (occurrence)	No decline, subject to natural processes.			
Vegetation composition: positive indicator species (number at a representative number of 2m x 2m monitoring stops; within 20m surrounding area of monitoring stops)	At least seven positive indicator species present in monitoring stop or, if five to six present in stop, additional species within 20m of stop; this includes at least one 'high quality' positive indicator species present in the stop or within 20m of stop.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could potentially have significant negative effects on the abundance of wet grassland *Molinia* meadows indicator species in the SAC, where the habitat has a direct interaction with the River Shannon through seasonal flooding. Although unlikely, given the SAC boundary is more than 17km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that INNS capable of colonising terrestrial habitats along the River Shannon could be spread to *Molinia* meadow habitat in the SAC via the surface water network during the Construction Phase and/or the Operational Phase. Introducing plant INNS could negatively affect the number, abundance and diversity of typical species.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Shannon Callows SAC are avoided (Section 7.9.4). Measures to prevent the spread of INNS during the Construction Phase and/or the Operational Phase would be implemented to ensure they are not introduced to the River Shannon Callows SAC (Section 7.9.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: negative indicator species (percentage at a representative number of 2m x 2m monitoring stops)	Negative indicator species collectively not more than 20% cover, with cover by an individual species not more than 10%.	No The Proposed Project would not directly affect *Molinia* meadow habitat within the SAC and therefore, would not affect negative indicator species cover on *Molinia* meadow habitat (non-native species as per O'Neill *et al*. 2013) However, plant INNS could also be considered separate to that list – and could have the potential to negatively affect *Molinia* meadow habitat areas – see below.	No	No potential for effects.
Vegetation composition: non-native species (percentage at a representative number of 2m x 2m monitoring stops)	Non-native species cover not more than 1%.	Yes Although unlikely, given the SAC boundary is more than 17km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that INNS capable of colonising terrestrial wetland habitats along the River Shannon could be spread to *Molinia* meadow habitat in the SAC via the surface water network during the Construction Phase and/or the Operational Phase.	Yes Measures to prevent the spread of INNS during the Construction Phase and/or the Operational Phase would be implemented to ensure they are not introduced to the River Shannon Callows SAC (Section 7.9.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation composition: moss species (representative number of 2m x 2m monitoring stops)	Hair mosses (*Polytrichum* spp.) not more than 25% cover.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could potentially have significant negative effects on the vegetation composition of wet grassland *Molinia* meadows, where the habitat has a direct interaction with the River Shannon through seasonal flooding.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Shannon Callows SAC are avoided (Section 7.9.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation structure: woody species and bracken (percentage at a representative number of 2m x 2m monitoring stops)	Cover of woody species and bracken (*Pteridium aquilinum*) not more than 5% cover.	No The Proposed Project would not directly affect *Molinia* habitat within the SAC and poses no risk of affecting the cover of woody species or bracken.	No	No potential for effects.
Vegetation structure: broadleaf herb: grass ratio (percentage at a representative number of 2m x 2m monitoring stops)	Broadleaf herb component of vegetation between 40% and 90%.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could potentially have significant negative effects on the vegetation structure of wet grassland *Molinia* meadows, where the habitat has a direct interaction with the River Shannon through seasonal flooding. Although unlikely, given the SAC boundary is more than 17km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that INNS capable of colonising terrestrial habitats along the River Shannon could be spread to *Molinia* meadow habitat in the SAC via the surface water network during the Construction Phase and/or the Operational Phase. Introducing plant INNS could negatively affect the broadleaf herb:grass ratio or the sward height.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Shannon Callows SAC are avoided (Section 7.9.4). Measures to prevent the spread of INNS during the Construction Phase and/or the Operational Phase would be implemented to ensure they are not introduced to the River Shannon Callows SAC (Section 7.9.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation structure: sward height (percentage at a representative number of 2m x 2m monitoring stops)	At least 30% of sward between 10cm and 80cm tall.			
Vegetation structure: litter (percentage at a representative number of 2m x 2m monitoring stops)	Litter cover not more than 25%.	No The Proposed Project would not directly affect *Molinia* habitat within the SAC and poses no risk of affecting the percentage litter cover.	No	No potential for effects.
Physical structure: bare ground (percentage at a representative number of 2m x 2m monitoring stops)	Not more than 10% bare ground.	No The Proposed Project would not affect, or contribute to, levels of grazing or habitat disturbance in the SAC that would affect the cover of bare ground within *Molinia* habitat.		
Physical structure: grazing or disturbance (Area in local vicinity of a representative number of monitoring stops)	Area of the habitat showing signs of serious grazing or other disturbance less than 20m².	No The Proposed Project would not affect, or contribute to, physical disturbance levels in the SAC that would damage *Molinia* habitat.		

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
[6510] Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) **To restore the favourable conservation condition of the habitat in the River Shannon Callows SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes.	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to the River Shannon Callows SAC. As lowland hay meadows are terrestrial habitats with no intrinsic dependence on surface water interactions to support the vegetation composition or structure, the Proposed Project poses no risk of affecting any of the attributes and targets supporting the favourable conservation status of limestone pavement habitat in the River Shannon Callows SAC.	No	No potential for effects.
Habitat distribution (occurrence)	No decline, subject to natural processes.			
Vegetation composition: positive indicator species (number at a representative number of 2m x 2m monitoring stops; within 20m surrounding area of monitoring stops)	At least seven positive indicator species present in monitoring stop or, if five to six present in stop, additional species within 20m of stop; this includes at least one 'high quality' positive indicator species present in stop or within 20m of stop.			
Vegetation composition: negative indicator species (percentage at a representative number of 2m x 2m monitoring stops)	Negative indicator species collectively not more than 20% cover, with cover by an individual species not more than 10%.			
Vegetation composition: non-native species (percentage at a representative number of 2m x 2m monitoring stops)	Non-native species cover not more than 1%.			
Vegetation structure: woody species and bracken (percentage at a representative number of 2m x 2m monitoring stops)	Cover of woody species and bracken (*Pteridium aquilinum*) not more than 5% cover.			
Vegetation structure: broadleaved herb: grass ratio (percentage at a representative number of 2m x 2m monitoring stops)	Broadleaved herb component of vegetation between 40% and 90%.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation structure: sward height (percentage at a representative number of 2m x 2m monitoring stops)	At least 50% of sward between 10cm and 50cm tall.	Cont. - as above	Cont. - as above	Cont. - as above
Vegetation structure: litter (percentage at a representative number of 2m x 2m monitoring stops)	Litter cover not more than 25%.			
Physical structure: bare soil (percentage at a representative number of 2m x 2m monitoring stops)	Not more than 5% bare soil.			
Physical structure: disturbance (area in local vicinity of a representative number of monitoring stops)	Area showing signs of serious grazing or other disturbance less than 20m².			
[7230] Alkaline fens **To maintain the favourable conservation condition of the habitat in River Shannon Callows SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality downstream in the River Shannon Callows and any associated alkaline fen habitat in the River Shannon Callows SAC. Although the River Shannon Callows SAC boundary is more than 18km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via watercourses crossed by the Proposed Project, to alkaline fen habitat within the SAC. These impacts could negatively affect the area or the distribution of alkaline fen habitat in the River Shannon Callows SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in the River Shannon Callows SAC are avoided (Section 7.8.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Shannon Callows SAC (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.
Habitat distribution (occurrence)	No decline, subject to natural processes.			
Ecosystem function: soil nutrients (soil pH and appropriate nutrient levels at a representative number of monitoring stops)	Maintain soil pH and nutrient status within natural ranges.	No Although the Proposed Project lies upstream of the River Shannon Callows SAC, given the nature of the Proposed Project, it poses no risk of affecting nutrient levels in receiving watercourses downstream or in alkaline fen habitat in the SAC.	No	No potential for effects.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Ecosystem function: peat formation (percentage cover of peat-forming vegetation and water table levels)	Maintain active peat formation, where appropriate.	No The Lower Shannon catchment would be crossed by the Proposed Project upstream of the River Shannon Callows SAC. The pipeline at the stream crossings would be installed using open cut techniques and although there is a risk of temporary (ranging from one week up to one month in a worst-case scenario) changes to the hydrological regime in those watercourses during the Construction Phase, there is no significant long-term or permanent risk to the functioning of the hydrological regime of the River Shannon supporting alkaline fen habitat in the River Shannon Callows SAC.	No	No potential for effects.
Ecosystem function: hydrology - groundwater levels (water levels (centimetres; duration of levels; hydraulic gradients; water supply)	Maintain, or restore where necessary, appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat			
Ecosystem function: hydrology - surface water flow (drain density and form)	Maintain, or restore where necessary, as close as possible to natural or seminatural drainage conditions.			
Ecosystem function: water quality (various)	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality in the Lower Shannon catchment which drain to the River Shannon Callows SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in the River Shannon Callows SAC are avoided (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation composition: community diversity (abundance of variety of vegetation communities)	Maintain variety of vegetation communities, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality downstream in the River Shannon and any associated alkaline fen habitat in the River Shannon Callows SAC. Although the River Shannon Callows SAC boundary is more than 18km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via watercourses crossed by the Proposed Project, to alkaline fen habitat within the SAC. These impacts could negatively affect the diversity of vegetation communities associated with alkaline fen habitat in the River Shannon Callows SAC, or vegetation composition and the abundance of positive brown moss indicator species or vascular plant positive indicator species, associated with alkaline fen habitat in the River Shannon Callows SAC. These impacts could also negatively affect the vegetation composition of alkaline fen habitat in the River Shannon Callows SAC and provide suitable conditions/opportunities for negative indicator species to establish.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in the River Shannon Callows SAC are avoided (Section 7.8.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Shannon Callows SAC (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: typical brown mosses (percentage cover at a representative number of monitoring stops)	Maintain adequate cover of typical brown moss species.			
Vegetation composition: typical vascular plants (Percentage cover at a representative number of monitoring stops)	Maintain adequate cover of typical vascular plant species.			
Vegetation composition: native negative indicator species (percentage cover at a representative number of monitoring stops)	Cover of native negative indicator species at insignificant levels.			
Vegetation composition: non-native species (percentage cover at a representative number of monitoring stops)	Cover of non-native species less than 1%	Yes Although the River Shannon Callows SAC boundary is more than 18km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via watercourses crossed by the Proposed Project, to alkaline fen habitat within the SAC. This impact could negatively affect the vegetation composition of alkaline fen habitat in the River Shannon Callows SAC.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Shannon Callows SAC (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: native trees and shrubs (percentage cover in local vicinity of a representative number of monitoring stops)	Cover of scattered native trees and shrubs less than 10%	No The Lower Shannon catchment is the only potential impact pathway connecting the Proposed Project to alkaline fen habitat within the River Shannon Callows SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of increasing the cover of native trees and shrubs, or algal cover in alkaline fen habitat in the SAC (see above for discussion on negative indicator species and INNS).	No	No potential for effects.
Vegetation composition: algal cover (percentage cover at, and in local vicinity of, a representative number of monitoring stops)	Cover of algae less than 2%			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation structure: vegetation height (percentage cover at a representative number of monitoring stops)	At least 50% of the live leaves/flowering shoots are more than either 5cm or 15cm above ground surface depending on community type	Yes Although the River Shannon Callows SAC boundary is more than 18km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk during the Construction Phase or the Operational Phase that INNS capable of colonising terrestrial or wetland habitats could be spread to the River Shannon, via the Little Brosna River, to alkaline fen habitat within the SAC. This impact could negatively affect vegetation height in alkaline fen habitat in the River Shannon Callows SAC.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Shannon Callows SAC (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.
Physical structure: disturbed bare ground (Percentage cover at, and in local vicinity of, a representative number of monitoring stops)	Cover of disturbed bare ground not more than 10%.	No The Lower Shannon catchment is the only potential impact pathway connecting the Proposed Project to alkaline fen habitat within the River Shannon Callows SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of increasing the percentage cover of disturbed bare ground.	No	No potential for effects.
Physical structure: tufa formations (percentage cover in local vicinity of a representative number of monitoring stops)	Disturbed proportion of vegetation cover where tufa is present is less than 1%.	No The Proposed Project boundary is over 18km directly away from the River Shannon Callows SAC boundary and would not involve any works within the SAC that would result in drainage of alkaline fen habitat or that would disturb tufa formations or any vegetation associated with alkaline fen habitat.	No	No potential for effects.
Indicators of local distinctiveness (occurrence and population size)	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on the water quality downstream in the River Shannon and any associated alkaline fen habitat in the River Shannon Callows SAC. Although the River Shannon Callows SAC boundary is more than 18km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk that during the Construction Phase or the Operational Phase, INNS capable of colonising terrestrial or wetland habitats could be spread, via watercourses crossed by the Proposed Project, to alkaline fen habitat within the SAC. These impacts could negatively affect the vegetation composition, and the abundance of locally distinctive species, in alkaline fen habitat in the River Shannon Callows SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland/fen habitats in the River Shannon Callows SAC are avoided (Section 7.8.4). Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Shannon Callows SAC (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Transitional areas between fen and adjacent habitats (hectares; distribution)	Maintain adequate transitional areas to support/protect the alkaline fen habitat and the services it provides.	Yes Although the River Shannon Callows SAC boundary is more than 18km from where the Proposed Project crosses watercourses that drain to this SAC, there is a risk during the Construction Phase or the Operational Phase that INNS capable of colonising terrestrial or wetland habitats could be spread to the River Shannon, via the Little Brosna River, which could negatively affect transitional areas within the SAC.	Yes Measures to prevent the spread of INNS during the Construction Phase and Operational Phase would be implemented to ensure they are not introduced to the River Shannon Callows SAC (Section 7.8.4).	No potential for effects, following the implementation of mitigation measures.
[8240] *Limestone pavements **To maintain the favourable conservation condition of the habitat in the River Shannon Callows SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes.	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to the River Shannon Callows SAC. As limestone pavement is a terrestrial habitat with no intrinsic dependence on surface water interactions to support the vegetation composition or structure, the Proposed Project poses no risk of affecting any of the attributes and targets supporting the favourable conservation status of limestone pavement habitat in the River Shannon Callows SAC.	No	No potential for effects.
Habitat distribution (occurrence)	No decline.			
Vegetation composition: positive indicator species (number at a representative number of monitoring stops)	At least seven positive indicator species present.			
Vegetation composition: bryophyte layer (percentage at a representative number of monitoring stops)	Bryophyte cover at least 50% on wooded pavement.			
Vegetation composition: negative indicator species (percentage at a representative number of monitoring stops)	Collective cover of negative indicator species on exposed pavement not more than 1%.			
Vegetation composition: non-native species (percentage at a representative number of monitoring stops)	Cover of non-native species not more than 1% on exposed pavement; on wooded pavement not more than 10% with no regeneration.			
Vegetation composition: scrub (percentage at a representative number of monitoring stops)	Scrub cover no more than 25% of exposed pavement.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation composition: bracken cover (percentage at a representative number of monitoring stops)	Bracken (*Pteridium aquilinum*) cover no more than 10% on exposed pavement.	Cont. - as above	Cont. - as above	Cont. - as above
Vegetation structure: woodland canopy (percentage at a representative number of monitoring stops)	Canopy cover on wooded pavement at least 30%.			
Vegetation structure: dead wood (occurrence in a representative number of monitoring stops)	Sufficient quantity of dead wood on wooded pavement to provide habitat for saproxylic organisms.			
Physical structure: disturbance (occurrence in a representative number of monitoring stops)	No evidence of grazing pressure on wooded pavement.			
Indicators of local distinctiveness (occurrence)	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
[91E0] *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) **To maintain the favourable conservation condition of the habitat in the River Shannon Callows SAC, which is defined by the following list of attributes and targets:**				
Habitat area (hectares)	Area stable or increasing, subject to natural processes.	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to alluvial woodland habitat within the River Shannon Callows SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of affecting the woodland area, the distribution of alluvial woodlands in the SAC, or the size of alluvial woodlands in the SAC (see also woodland regeneration below in terms of potential long-term effects of introducing INNS to woodland habitats).	No	No potential for effects.
Habitat distribution (occurrence)	No decline, subject to natural processes.			
Woodland size (hectares)	Area stable or increasing. Where topographically possible, 'large' woods at least 25ha in size and 'small' woods at least 3ha in size.			
Woodland structure: cover and height (percentage and metres)	Total canopy cover at least 30%; median canopy height at least 7m; native shrub layer cover 10-75%; native herb/dwarf shrub layer cover at least 20% and height at least 20cm; bryophyte cover at least 4%.	Yes Although unlikely, given the SAC boundary is more than 17km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that INNS capable of colonising alluvial woodland habitats along the banks of the River Shannon could be spread to alluvial forest habitat in the SAC via the surface water network during the Construction Phase and/or the Operational Phase. Introducing plant INNS could affect the structure of the woodland community, most likely through plant INNS outcompeting and overgrowing the shrub and herb layers in the woodland.	Yes Measures to prevent the spread of INNS during the Construction Phase and/or the Operational Phase would be implemented to ensure they are not introduced to the River Shannon Callows SAC (Section 7.9.4).	No potential for effects, following the implementation of mitigation measures.
Woodland structure: community diversity and extent (hectares)	Maintain diversity and extent of community types.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on sensitive woodland plant species where the habitat has a direct interaction with the River Shannon through seasonal flooding (some of which may be considered locally distinctive). Although unlikely, given the SAC boundary is more than 17km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that INNS capable of colonising alluvial woodland habitats along the banks of the River Shannon could be spread to alluvial forest habitat in the SAC via the surface water network during the Construction Phase and/or the Operational Phase. Introducing plant INNS could negatively affect the number, abundance and diversity of any locally distinctive species. Both of these potential impacts could affect the diversity of the woodland community.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Shannon Callows SAC are avoided (Section 7.9.4). Measures to prevent the spread of INNS would be implemented to ensure they are not introduced to the River Shannon Callows SAC (Section 7.9.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Woodland structure: natural regeneration (seedling:sapling:pole ratio)	Seedlings, saplings and pole age-classes of target species for 91E0* woodlands and other native tree species occur in adequate proportions to ensure survival of woodland canopy.	Yes Although unlikely, given the SAC boundary is more than 17km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that INNS capable of colonising alluvial woodland habitats along the banks of the River Shannon could be spread to alluvial forest habitat in the SAC via the surface water network during the Construction Phase and/or the Operational Phase. Introducing plant INNS could affect the natural regeneration of woodland flora, most likely through plant INNS outcompeting and overgrowing the shrub and herb layers in the woodland.	Measures to prevent the spread of INNS would be implemented to ensure they are not introduced to the River Shannon Callows SAC (Section 7.9.4).	No potential for effects, following the implementation of mitigation measures.
Hydrological regime: flooding depth/height of water table (metres)	Appropriate hydrological regime necessary for maintenance of alluvial vegetation.	No The Little Brosna and Camcor sub-catchments would be crossed by the Proposed Project upstream of the River Shannon Callows SAC. The pipeline at most of the stream crossings would be installed using open cut techniques and although there is a risk of temporary (ranging from one week up to one month in a worst-case scenario) changes to the hydrological regime in those watercourses during the Construction Phase, there is no significant long-term or permanent risk to the functioning of the hydrological regime of the River Shannon supporting alluvial woodland habitat in the River Shannon Callows SAC.	No	No potential for effects.
Woodland structure: dead wood (m^3 per hectare; number per hectare)	At least 19 stems/ha of dead wood at least 20cm diameter.	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to alluvial forest habitat within the River Shannon Callows SAC. Any potential effects on water quality during the Construction Phase, or any risk of introducing INNS, poses no risk of affecting the abundance of dead wood in the alluvial woodlands.	No	No potential for effects.
Woodland structure: veteran trees (number per hectare)	No decline.	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to alluvial forest habitat within the River Shannon Callows SAC. Any potential effects on water quality during the Construction Phase pose no risk of affecting the numbers/ abundance of woodland tree species.	No	No potential for effects.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Woodland structure: indicators of local distinctiveness (occurrence; population size)	No decline in distribution and, in the case of Red Listed and other rare or localised species, population size.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on sensitive woodland plant species where the habitat has a direct interaction with the River Shannon through seasonal flooding (some of which may be considered locally distinctive). Although unlikely, given the SAC boundary is more than 17km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that INNS capable of colonising terrestrial woodland habitats along the River Shannon could be spread to alluvial forest habitat in the SAC via the surface water network during the Construction Phase and/or the Operational Phase. Introducing plant INNS could negatively affect the number, abundance and diversity of any locally distinctive species.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Shannon Callows SAC are avoided (Section 7.9.4). Measures to prevent the spread of INNS during the Construction Phase and/or the Operational Phase would be implemented to ensure they are not introduced to the River Shannon Callows SAC (Section 7.9.4).	No potential for effects, following the implementation of mitigation measures.
Woodland structure: indicators of overgrazing (occurrence)	All five indicators of overgrazing absent.	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to alluvial forest habitat within the River Shannon Callows SAC. Any potential effects on water quality during the Construction Phase pose no risk of affecting the numbers/ abundance of woodland tree species.	No	No potential for effects.
Vegetation composition: native tree cover (percentage)	No decline. Native tree cover at least 90% of canopy; target species cover at least 50% of canopy.	No The existing surface water network of watercourses is the only potential impact pathway connecting the Proposed Project to alluvial forest habitat within the River Shannon Callows SAC. Any potential effects on water quality during the Construction Phase pose no risk of affecting the numbers/ abundance/composition of woodland tree species.	No	No potential for effects.
Vegetation composition: typical species (occurrence)	At least one target species for 91E0* woodlands present; at least six positive indicator species for 91E0* woodlands present.	Yes An accidental pollution event during the Construction Phase or the Operational Phase, of a sufficient magnitude, could potentially have significant negative effects on sensitive native woodland plant species where the habitat has a direct interaction with the River Shannon through seasonal flooding. Although unlikely, given the SAC boundary is more than 17km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that INNS capable of colonising terrestrial woodland habitats along the River Shannon could be spread to alluvial forest habitat in the SAC via the surface water network during the Construction Phase and/or the Operational Phase. Introducing plant INNS could negatively affect the number, abundance and diversity of native woodland species.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Shannon Callows SAC are avoided (Section 7.9.4). Measures to prevent the spread of INNS during the Construction Phase and/or the Operational Phase would be implemented to ensure they are not introduced to the River Shannon Callows SAC (Section 7.9.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Vegetation composition: negative indicator species (occurrence)	Negative indicator species cover not greater than 10%; regeneration of negative indicator species absent.	Yes Although unlikely, given the SAC boundary is more than 17km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that INNS capable of colonising terrestrial woodland habitats along the River Shannon could be spread to alluvial forest habitat in the SAC via the surface water network during the Construction Phase and/or the Operational Phase.	Yes Measures to prevent the spread of INNS during the Construction Phase and/or the Operational Phase would be implemented to ensure they are not introduced to the River Shannon Callows SAC (Section 7.9.4).	No potential for effects, following the implementation of mitigation measures.
Vegetation composition: problematic native species (percentage)	Cover of common nettle (*Urtica dioica*) less than 75%.	Yes Although unlikely, given the SAC boundary is more than 17km from where the Proposed Project crosses watercourses that drain to this SAC, there remains a risk that INNS capable of colonising terrestrial woodland habitats along the River Shannon could be spread to alluvial forest habitat in the SAC via the surface water network during the Construction Phase and/or the Operational Phase.	Yes Measures to prevent the spread of INNS during the Construction Phase and/or the Operational Phase would be implemented to ensure they are not introduced to the River Shannon Callows SAC (Section 7.9.4).	No potential for effects, following the implementation of mitigation measures.
[1355] Otter *Lutra lutra* **To maintain the favourable conservation condition of otter in the River Shannon Callows SAC, which is defined by the following list of attributes and targets:**				
Distribution (percentage positive survey sites)	No significant decline.	No As the Proposed Project boundary is 14.7km directly away from the SAC site boundary, it poses no risk of disturbing or displacing otter from habitat areas used within the SAC during the Construction Phase or the Operational Phase.	No	No potential for effects.
Extent of terrestrial habitat (hectares)	No significant decline. Area mapped and calculated as 282.1ha.	No As the Proposed Project would not have any direct impacts on habitats, or result in any habitat loss, within the SAC the extent of terrestrial habitat, river habitat or lake habitat available to otter would not be affected.	No	No potential for effects.
Extent of freshwater (river) habitat (kilometres)	No significant decline. Length mapped and calculated as 146.7km.			
Couching sites and holts (number)	No significant decline.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could (at least temporarily) potentially have significant negative effects on usage of holt/couch sites available for otter in the SAC.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Shannon Callows SAC are avoided (Section 7.9.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Fish biomass available (kilograms)	No significant decline.	Yes An accidental pollution event during the Construction Phase or the Operational Phase of a sufficient magnitude could have significant negative impacts on fish through silt smothering spawning grounds or affecting respiration, chemical contaminants physically damaging fish or causing mortality as a result of toxins. Such impacts could result in a reduction in fish numbers, at least temporarily.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase and Operational Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on associated wetland habitats in the River Shannon Callows SAC are avoided (Section 7.9.4).	No potential for effects, following the implementation of mitigation measures.
Barriers to connectivity (number)	No significant increase.	No The watercourses crossed by the Proposed Project that drain to this SAC are more than 30km upstream of the SAC boundary and any temporary barrier effect posed by instream works during open cut pipeline installation would not affect usage of watercourses by otter within the SAC.	No	No potential for effects.

7.9.4 Design Requirements and Mitigation Measures

1274. The positioning of the infrastructure associated with the Proposed Project has been designed to avoid European sites, where possible, and to minimise the risks of indirect effects as far as is possible. The design measures are described in Section 3.5.

7.9.4.1 Construction Phase Mitigation

1275. The mitigation measures to protect water quality in the receiving environment during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example: the use of sandbags, silt curtains or similar barriers, buffers of natural uncleared vegetation, and suspension of works within and adjacent to watercourses during periods of heavy rainfall. Such mitigation measures are considered best practice and are in accordance with IFI (2016) guidelines.

1276. The mitigation measures to ensure that INNS are not spread or introduced to the River Shannon Callows SAC during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example: the thorough cleaning of plant and equipment using a power washer unit prior to leaving site, in accordance with the OPW Environmental Standard Operating Procedures (OPW 2011) and/or IFI Biosecurity Protocols (IFI 2010).

1277. The mitigation measures to ensure that otter are not killed during the Construction Phase as a result of construction works directly, or through water quality impacts, are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include for example, the use of mammal-resistant fencing which is considered best practice and is an approved method in NRA (2008b).

7.9.4.2 Operational Phase Mitigation

1278. The mitigation measures to protect water quality in the receiving environment during the Operational Phase are similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

1279. The mitigation measures to ensure that INNS are not spread or introduced to the River Shannon Callows SAC during the Operational Phase are also similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

7.9.5 Residual Impacts

1280. The Proposed Project has the potential to negatively affect water quality in the receiving surface water environment during the Construction Phase and the Operational Phase and, as watercourses crossed by the Proposed Project drain to the River Shannon, there is the potential for the conservation objectives of the River Shannon Callows SAC to be negatively affected. Mitigation measures will be implemented to ensure that the receiving surface water network is protected and the conservation objectives of the River Shannon Callows SAC are not negatively affected by the Proposed Project.

1281. The Proposed Project has the potential to spread and introduce INNS to the River Shannon Callows SAC via the surface water of the Little Brosna River catchment, which drains to the River Shannon and the River Shannon Callows SAC. Mitigation measures will be implemented to ensure that any INNS present within the Construction Working Width or the 20m wide Permanent Wayleave are controlled and are not spread to the River Shannon Callows SAC, and that the conservation objectives of the River Shannon Callows SAC are not negatively affected by the Proposed Project.

1282. The Proposed Project has the potential to result in the mortality of otter during the Construction Phase which may potentially affect the otter population of the River Shannon Callows SAC. Mitigation measures will be implemented to ensure that otter are not killed as a result of construction works, or as a result of a reduction in water quality in receiving water bodies, and that the conservation objectives of the River Shannon Callows SAC that support the qualifying interest otter population are not negatively affected by the Proposed Project.

1283. There are therefore, no residual direct or indirect impacts associated with the Proposed Project that could adversely affect the integrity of the River Shannon Callows SAC.

7.9.6 Conclusion of Assessment for River Shannon Callows SAC 216

1284. None of the potential direct or indirect impacts associated with the Proposed Project would affect the conservation objectives of any of the qualifying interest habitats or species of the River Shannon Callows SAC. Mitigation measures are included to ensure that water quality in the receiving surface water environment is protected, that INNS are not spread or introduced to the River Shannon Callows SAC, and that otter are not affected by construction works.

1285. The examination, analysis and evaluation covered all relevant information in respect of the qualifying interest habitats and species of the SAC. This included the potential impacts, mitigation and prevention measures, and whether or not the predicted impacts would affect the conservation objectives that support the conservation condition for the qualifying interests concerned (either directly or indirectly; refer to Section 8 for the in-combination assessment). It has been concluded beyond reasonable scientific doubt that, subject to the implementation of mitigation measures, the Proposed Project would not adversely affect the integrity of the River Shannon Callows SAC.

7.10 Slievefelim to Silvermines Mountains SPA 4165

7.10.1 Special Conservation Interest Species and Conservation Objectives of Slievefelim to Silvermines Mountains SPA 4165

1286. The special conservation interest species of the Slievefelim to Silvermines Mountains SPA, and the overall conservation objective for it, is presented in Table 7.30.

Table 7.30: Special Conservation Interest Species and Conservation Objectives of Slievefelim to Silvermines Mountains SPA (NPWS 2022b)

Special Conservation Interests	Conservation Objectives
Hen harrier (*Circus cyaneus*) [A082]	To restore favourable conservation condition

1287. In conjunction with considering the generic conservation objective, to maintain or restore the favourable conservation condition of the Annex I species for which the SPA has been selected, the available site-specific conservation objectives document for Slievefelim to Silvermines Mountains SPA (NPWS 2022b) also informed this assessment. This document sets out the attributes, measures and targets that define the favourable conservation condition of special conservation interest species within the European site.

7.10.2 Ecological Baseline Description for Slievefelim to Silvermines Mountains SPA 4165

1288. The Slievefelim to Silvermines Mountains SPA is an extensive upland site located in Counties Tipperary and Limerick. Much of the site is over 200m in altitude and rises to 694m at Keeper Hill. Other peaks included in the site are Slieve Felim, Knockstanna, Knockappul, Mother Mountain, Knockteige, Cooneen Hill and Silvermine Mountain. The site is underlain mainly by sandstones of Silurian age. Several important rivers rise within the site, including the Mulkear, Bilboa and Clare (DAHG 2015a).

1289. The site consists of a variety of upland habitats, though approximately half is afforested. The coniferous forests include first and second rotation plantations, with both pre-thicket and post-thicket stands present. Substantial areas of clear-fell are also present at any one time. The principal tree species present are Sitka spruce and lodgepole pine (*Pinus contorta*). Roughly one-quarter of the site is unplanted blanket bog and heath, with both wet and dry heath present. The bog and heath vegetation includes such typical species as ling heather, bilberry (*Vaccinium myrtillus*), bell heather (*Erica cinerea*), common cottongrass, hare's-tail Cottongrass (*Eriophorum vaginatum*), deergrass and purple moor-grass. The remainder of the site is mostly rough grassland that is used for hill farming. This varies in composition and includes some wet areas with rushes (*Juncus* spp.) and some areas subject to scrub encroachment. Some stands of deciduous woodland also occur, especially within the river valleys (DAHG 2015a).

1290. The site is one of the strongholds for hen harrier in the country. A survey in 2005 recorded five breeding pairs in the SPA, while nine pairs had been recorded in the 1998-2000 period. These numbers recorded in 2005 represent 3.7% of the all-Ireland total. The mix of forestry and open areas provides optimum habitat conditions for this rare bird, which is listed on Annex I of the Birds Directive. The early stages of new and second-rotation conifer plantations are the most frequently used nesting sites, though some pairs may still nest in tall heather of unplanted bogs and heath. Hen harriers would forage up to c.5km from the nest site, utilising open bog and moorland, young conifer plantations and hill farmland that is not too rank. Birds would often forage in openings and gaps within forests. In Ireland, small birds and small mammals appear to be the most frequently taken prey (DAHG 2015a).

1291. The site is also a traditional breeding site for a pair of peregrine. Merlin has been recorded within the site but further survey is required to determine its status at this site. Red grouse is found on some of the unplanted areas of bog and heath. This is a species that has declined in Ireland and is now Red-listed (DAHG 2015a).

1292. The Slievefelim to Silvermines Mountains SPA is of ornithological importance because it provides excellent nesting and foraging habitat for breeding hen harrier and is one of the top sites in the country for the species. The presence of three species, hen harrier, merlin and peregrine, which are listed on Annex I of the Birds Directive is of note. Potential effects of Annex I bird species that are not special conservation interest species are considered in the EIAR.

1293. In 2016, no evidence of hen harrier breeding activity in any potentially suitable habitats along a previous iteration of the project was recorded during Breeding Bird Walkover Surveys. Due to the lack of sightings and lack of suitable breeding habitat for this species within the study area, specific breeding bird surveys for hen harrier were not undertaken. However, hen harrier sightings were recorded during other breeding bird surveys such as lowland wader surveys. No breeding hen harrier were recorded in the study area during the 2016 to 2022 breeding seasons (EIAR Appendix A8.21: Breeding Bird Surveys Summary Report). There was only one record of hen harrier during the breeding season in May 2018. This individual was recorded calling in Timahoe East, approximately 200m south of the Construction Working Width.

1294. The Proposed Project boundary is located c.1.5km to the north-west of the Slievefelim to Silvermines Mountains SPA boundary and does not overlap with this European site. The hydrogeological ZoI of the Proposed Project does not extend to 1.5km upgradient and poses no risk of hydrogeological effects within the Slievefelim to Silvermines Mountains SPA. There are also no hydrological pathways connecting the Proposed Project with the Slievefelim to Silvermines Mountains SPA, as the SPA is upstream of any of the watercourses crossed by the Proposed Project.

7.10.3 Examination and Analysis of Potential Direct and Indirect Impacts

1295. As the Proposed Project does not overlap with the Slievefelim to Silvermines Mountains SPA, hen harrier habitat within the SPA would not be directly impacted. The Slievefelim to Silvermines Mountains SPA (and potential ex-situ sites) also lies beyond the ZoI of any hydrogeological, hydrological impacts or air quality impacts. The Operational Phase of the Proposed Project poses no risk of disturbing or displacing hen harrier, as none of the habitats within the ZoI of operational activities are suitable habitats for hen harrier.

1296. However, the Proposed Project could (in the absence of mitigation measures) potentially affect the conservation objective attributes and targets supporting the conservation condition of the hen harrier population of the Slievefelim to Silvermines Mountains SPA, as it would result in habitats impacts during the Construction Phase within the foraging range of breeding hen harrier in the SPA (up to 10km). Construction works may also disturb or displace hen harrier within their foraging range from the SPA.

7.10.3.1 Construction Phase

7.10.3.1.1 Habitat Loss

1297. Although the traditional nesting habitat of the hen harrier is open heathland, in Ireland, newly established conifer plantations are important nesting and hunting habitat for hen harrier (e.g. first rotation and second rotation forest, thicket stage forest and clear-felled forest). Other habitats favoured by hen harrier for hunting are heathlands and rough grasslands. Improved grazing habitat is not favoured by hen harrier (Ruddock *et al.* 2016; Wilson *et al*. 2010).

1298. The core foraging range of breeding hen harrier is 2km (SNH 2016) and within this distance of the Slievefelim to Silvermines Mountains SPA, approximately 85ha of habitat would be directly impacted. Of that c.85ha of directly affected habitat, the majority (c.70ha) is improved agricultural grassland and therefore, habitat that is not critical in supporting the breeding population of the SPA. Furthermore, habitat loss impacts would be temporary (up to 18 months) with all of the habitat affected by the pipeline installation works to be reinstated post construction, and reinstated habitat would likely continue to be

managed by the landowners in line with its current agricultural use. Therefore, there would not be any permanent loss of hen harrier habitat within 2km of any nest sites within the Slievefelim to Silvermines Mountains SPA that is important in supporting the breeding population.

1299. Hen harrier can have a maximum foraging range of up to 10km during the breeding season (SNH 2016). Including the Slievefelim to Silvermines Mountains SPA, this encompasses an area of more than 1,100km^2 that may be used by the SPA's hen harrier population during the breeding season. Of that area, the Proposed Project would only directly impact c.188ha (<0.17%), the majority of which (c.111.51ha or approximately 59%) is improved agricultural grassland, and of relatively low importance in supporting the breeding hen harrier population of the Slievefelim to Silvermines Mountains SPA. Furthermore, the majority of habitat loss impacts would be temporary (up to 18 months) with all of the habitat affected by the pipeline installation works to be reinstated post-construction; and reinstated habitat would likely continue to be managed by the landowners in line with its current agricultural use. The exceptions to this temporary habitat loss are the RWI&PS site (2.3ha) and WTP site (27.54ha), both of which would be subject to permanent habitat loss and both of which are located within a 10km radius of the Slievefelim to Silvermines Mountains SPA. The habitats recorded at the RWI&PS site are not considered suitable for foraging or breeding hen harrier, however, the wet grassland habitat at the WTP may be used by hen harrier for hunting. However, this amounts to less than 0.025% of the total area in the foraging range of the hen harrier population of the Slievefelim to Silvermines Mountains SPA.

1300. The following habitats were recorded within the Proposed Project that are within 10km of the Slievefelim to Silvermines Mountains SPA:

- Arable crops (BC1) = 2.32ha
- Stone walls and other stonework (BL1) = 0.01ha
- Buildings and artificial surfaces (BL3) = 8.81ha
- Buildings and amenity grassland mosaic (BL3/GA2) = 0.15ha
- Spoil and bare ground (ED2) = 0.44ha
- Recolonising bare ground (ED3) = 0.14ha
- Active quarries (ED4) = 0.86ha
- Reservoirs (FL7) = 0.6ha
- Improved agricultural grassland (GA1) = 112.16ha
- Amenity grassland (GA2) = 0.10ha
- Dry calcareous and neutral grassland (GS1) = 0.01ha
- Dry meadows and grassy verges (GS2) = 5.38ha
- Dense bracken (HD1) = 0.6ha
- Wet grassland (GS4) = 47.79ha
- (Mixed) broadleaved woodland (WD1) = 5.94ha
- Mixed broadleaved/conifer woodland (WD2) = 2.13ha
- Conifer plantation (WD4) = 5.9ha
- Oak-ash-hazel woodland (WN2) = 0.26ha
- Riparian woodland (WN5) = 0.10ha
- Scrub (WS1) = 3.88ha
- Immature woodland (WS2) = 0.005ha

1301. Given that the habitats affected are generally of low suitability for foraging hen harrier, the temporary nature of the construction works and habitat impacts, and the relatively small area of habitat that would be temporarily or permanently affected during the Construction Phase in comparison to the total area surrounding the SPA that remains available to the breeding hen harrier population, there would not be any significant adverse effects on the breeding hen harrier population of the Slievefelim to Silvermines Mountains SPA due to habitat impacts.

7.10.3.1.2 Disturbance

1302. Disturbance to nesting hen harrier from construction activities has been recorded at distances of up to 1km (Ruddock and Whitfield 2007) but generally considered to be between 300-750m (Goodship and Furness 2022). The Slievefelim to Silvermines Mountains SPA is c.1.5km from the Proposed Project and is therefore beyond the ZoI of any disturbance or displacement effects during the Construction Phase.

1303. As discussed above in relation to habitat impacts, hen harrier range up to 10km from the nest site during the breeding season and the breeding population of the Slievefelim to Silvermines Mountains SPA may use habitat areas in the ZoI of the Proposed Project. Therefore, construction works may result in localised disturbance/displacement effects along the pipeline. However, given that the habitats affected are generally of low suitability for foraging hen harrier, the temporary nature of the construction works, and the abundance of alternative suitable habitat available surrounding the SPA there would not be any significant adverse effects on the breeding hen harrier population of the Slievefelim to Silvermines Mountains SPA due to construction-related disturbance.

7.10.3.2 Summary

1304. Table 7.31 presents a summary of the potential impacts on the special conservation interest species of the Slievefelim to Silvermines Mountains SPA as a result of the Proposed Project and how these impacts affect the site's conservation objectives. There are no special conservation interest species from this SPA present within the ZoI of the Proposed Project that could potentially be impacted.

Table 7.31: Special Conservation Interest Species of the Slievefelim to Silvermines Mountains SPA and Summary of Potential Impacts

Special Conservation Interests	Potential Impacts	
	Construction Phase	Operational Phase
Annex I Species		
Hen harrier (*Circus cyaneus*) [A082]	No potential for impacts associated with the Proposed Project to result in any significant adverse effects on the breeding hen harrier population of the Slievefelim to Silvermines Mountains SPA.	

1305. The specific attributes and targets used to define the conservation objectives of the special conservation interest species of the Slievefelim to Silvermines Mountains SPA are presented in Table 7.32, along with the potential impacts associated with the Proposed Project. Those special conservation interests, and the supporting attributes, measures, and targets at risk of being affected by the Proposed Project are highlighted in blue.

Table 7.32: Potential Impacts on the Conservation Objectives of the Slievefelim to Silvermines Mountains SPA

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Hen harrier (*Circus cyaneus*) [A082] **To restore the favourable conservation condition of the species in the Slievefelim to Silvermines Mountains SPA, which is defined by the following list of attributes and targets:**				
Population size (number of confirmed breeding pairs)	Maintain numbers at or above four to eight confirmed breeding pairs.	No At a distance of 1.5km from the Slievefelim to Silvermines Mountains SPA site boundary, the Proposed Project boundary lies within the potential core breeding (2km) and normal foraging (10km) ranges for the SPA's hen harrier population. Despite the relative proximity of the Proposed Project to Slievefelim to Silvermines Mountains SPA, given: • the temporary and localised nature of any construction-related disturbance within the range of the SPA's hen harrier population • the relatively small scale, and temporary nature, of the majority of the habitat loss/disturbance within the range of the SPA's hen harrier population • the relatively small permanent loss of habitat within the range of the SPA's hen harrier population there are no risks of any significant adverse population effects or a decrease in the numbers or range of areas used by hen harrier either within or outside of the SPA.	No	No potential for effects.
Productivity rate (number of fledged young per confirmed pair)	Restore at least 1.0–1.4 fledged young per confirmed pair.			
Spatial utilisation by breeding pairs (percentage)	Maintain at least 74-94% spatial utilisation of the SPA by breeding pairs.			
Extent and condition of heath and bog and associated habitats (hectares; condition assessment)	Restore the extent and quality of this resource to support the targets relating to population size, productivity rate and spatial utilisation.			
Extent and condition of low intensity managed grasslands and associated habitats (hectares; condition assessment)	Restore the extent and quality of this resource to support the targets relating to population size, productivity rate and spatial utilisation.			
Extent and condition of hedgerows (kilometres; condition assessment)	Maintain at least the length and quality of this resource to support the targets relating to population size, productivity rate and spatial utilisation.			
Age structure of forest estate (percentage)	Achieve an even and consistent distribution of age-classes across the forest estate.			
Disturbance to breeding sites (level of impact)	Disturbance occurs at levels that do not significantly impact upon breeding hen harrier.			

7.10.4 Design Requirements and Mitigation Measures

1306. The positioning of the infrastructure associated with the Proposed Project has been designed to avoid European sites, where possible, and to minimise the risks of indirect effects as far as is possible. The design measures are described in Section 3.5.

1307. Habitat loss impacts associated with installing the pipeline would be temporary and insignificant as habitat areas directly affected would be reinstated post-construction.

1308. As the Proposed Project would not have any effects on the breeding population of hen harrier in the Slievefelim to Silvermines Mountains SPA, mitigation measures are not needed.

7.10.5 Residual Impacts

1309. Although the Proposed Project would result in direct impacts on habitats within the range of breeding hen harrier in the Slievefelim to Silvermines Mountains SPA, the majority of habitat types affected are unsuitable to support foraging hen harrier, are beyond the core 2km range of any nest sites within the SPA, and where habitat areas suitable for hen harrier within the wider 10km range of the SPA's hen harrier population would be impacted, the effects would be temporary.

1310. There are therefore, no residual direct or indirect impacts associated with the Proposed Project that could adversely affect the integrity of the Slievefelim to Silvermines Mountains SPA.

7.10.6 Conclusion of Assessment for Slievefelim to Silvermines Mountains SPA 4165

1311. None of the potential direct or indirect impacts associated with the Proposed Project would affect the conservation objectives of the Slievefelim to Silvermines Mountains SPA's hen harrier population.

1312. The examination, analysis and evaluation covered all relevant information in respect of the special conservation interest species of the SPA. This included the potential impacts, mitigation and prevention measures and whether or not the predicted impacts would affect the conservation objectives that support the conservation condition for the special conservation interest species concerned (either directly or indirectly; refer to Section 8 for the in-combination assessment). It has been concluded beyond reasonable scientific doubt that, subject to the implementation of mitigation measures, the Proposed Project would not adversely affect the integrity of the Slievefelim to Silvermines Mountains SPA.

7.11 Slieve Bloom Mountains SPA 4160

7.11.1 Special Conservation Interest Species and Conservation Objectives of Slieve Bloom Mountains SPA 4160

1313. The special conservation interest species of the Slieve Bloom Mountains SPA, and the overall conservation objective for it, is presented in Table 7.33.

Table 7.33: Special Conservation Interest Species and Conservation Objectives of Slieve Bloom Mountains SPA (NPWS 2022c)

Special Conservation Interests	Conservation Objectives
Hen harrier (*Circus cyaneus*) [A082]	To restore favourable conservation condition

1314. In conjunction with considering the generic conservation objective, to maintain or restore the favourable conservation condition of the Annex I species for which the SPA has been selected, the available site-specific conservation objectives document for the Slieve Bloom Mountains SPA (NPWS 2022c) also informed this assessment. This document sets out the attributes, measures and targets that define the favourable conservation condition of the special conservation interest species within the European site.

7.11.2 Ecological Baseline Description for Slieve Bloom Mountains SPA 4160

1315. The Slieve Bloom Mountains SPA is situated on the border between Counties Offaly and Laois and runs along a north-east/south-west aligned ridge for approximately 25km. Much of the site is over 200m in altitude, rising to a maximum height of 527m at Arderin. The mountains are of Old Red Sandstone, flanked by Silurian rocks. Several important rivers rise within the site, including the Barrow, Delour and Silver (DAHG 2015b).

1316. The site has a near continuous ridge of mountain blanket bog, with wet and dry heaths also well represented. Species present in these habitats include ling heather, crowberry (*Empetrum nigrum*), bilberry, cottongrasses (*Eriophorum* spp.), deergrass and bog asphodel. Much of the slopes are afforested, and overall coniferous plantations account for c.60% of the site. The forests include first and second rotation plantations, with both pre-thicket and post-thicket stands present. Substantial areas of clear-fell are also present at any one time. The principal tree species present are Sitka spruce and lodgepole pine. The remainder of the site is mostly rough grassland that is used for hill farming. This varies in composition and includes some wet areas with rushes (*Juncus* spp.) and some areas subject to scrub encroachment. Some stands of deciduous woodland also occur, especially within the river valleys (DAHG 2015b).

1317. This SPA is one of the strongholds for hen harrier in the country and, indeed, is the most easterly regular population. A survey in 2005 recorded eight pairs, whereas eleven pairs had been recorded in the 1998-2000 period. The numbers recorded in 2005 represent c.3.7% of the all-Ireland total. The mix of forestry and open areas provides optimum habitat conditions for this rare bird, which is listed on Annex I of the Birds Directive. The early stages of new and second-rotation conifer plantations are the most frequently used nesting sites, though some pairs may still nest in tall heather of unplanted bogs and heath. Hen harriers would forage up to approximately 10km from the nest site, utilising open bog and moorland, young conifer plantations and hill farmland that is not too rank. Birds would often forage in openings and gaps within forests. In Ireland, small birds and small mammals appear to be the most frequently taken prey (DAHG 2015b).

1318. The site is also a traditional site for a breeding pair of peregrine. Several pairs of merlin are known to breed within the site but further survey is required to determine the exact status of this small falcon. Red grouse is found on many of the unplanted areas of bog and heath – this is a species that has declined

in Ireland and is now Red Listed. Potential effects of Annex I bird species that are not special conservation interest species are considered in the EIAR (DAHG 2015b).

1319. The Slieve Bloom Mountains SPA is of ornithological importance because it provides excellent nesting and foraging habitat for breeding hen harrier and is one of the top sites in the country for the species. The presence of three species, hen harrier, merlin and peregrine, which are listed on Annex I of the Birds Directive is of note. The Slieve Bloom Mountains is a Ramsar Convention site and a Biogenetic Reserve. Part of the Slieve Bloom Mountains SPA is a Statutory Nature Reserve (DAHG 2015b).

1320. As mentioned in Section 7.10.2, there were limited records of hen harrier in the study area during the 2016 to 2022 breeding season (EIAR Appendix A8.21: Breeding Bird Surveys Summary Report) and no evidence of breeding hen harrier was recorded.

1321. The Proposed Project boundary is located c.2.5km to the north-west of the Slieve Bloom Mountains SPA boundary and does not overlap with this European site. The hydrogeological ZoI of the Proposed Project does not extend to 2.5km upgradient and poses no risk of hydrogeological effects within the Slieve Bloom Mountains SPA. There are also no hydrological pathways connecting the Proposed Project with the Slieve Bloom Mountains SPA, as the SPA is upstream of any of the watercourses crossed by the Proposed Project.

7.11.3 Examination and Analysis of Potential Direct and Indirect Impacts

1322. As the Proposed Project does not overlap with the Slieve Bloom Mountains SPA, hen harrier habitat within the SPA would not be directly impacted. The Slieve Bloom Mountains SPA (and potential ex-situ sites) also lies beyond the ZoI of any hydrogeological, hydrological impacts or air quality impacts. The Operational Phase of the Proposed Project poses no risk of disturbing or displacing hen harrier, as none of the habitats within the ZoI of operational activities are suitable habitats for hen harrier.

1323. However, the Proposed Project could (in the absence of mitigation measures) potentially affect the conservation objective attributes and targets supporting the conservation condition of the hen harrier population of the Slieve Bloom Mountains SPA, as it would result in habitats impacts during the Construction Phase within the foraging range of breeding hen harrier in the SPA (up to 10km). Construction works may also disturb or displace hen harrier within their foraging range from the SPA.

7.11.3.1 Construction Phase

7.11.3.1.1 Habitat Loss

1324. Although the traditional nesting habitat of the hen harrier is open heathland, in Ireland newly established conifer plantations are important nesting and hunting habitat for hen harrier (e.g. first rotation and second rotation forest, thicket stage forest and clear-felled forest). Other habitats favoured by hen harrier for hunting are heathlands and rough grasslands. Improved grazing habitat is not favoured by hen harrier (Ruddock *et al.* 2016; Wilson *et al*. 2010).

1325. The core foraging range of breeding hen harrier is 2km (SNH 2016). The Proposed Project is c.2.5km away from the Slieve Bloom Mountains SPA and therefore, there would not be any permanent loss of hen harrier habitat within that core 2km zone that is important in supporting the breeding population.

1326. Hen harrier can have a maximum foraging range of up to 10km during the breeding season (SNH 2016). Including the Slieve Bloom Mountains SPA, this encompasses an area of more than 1,100km^2 that may be used by the SPAs hen harrier population during the breeding season. Of that area, the Proposed Project would only directly impact approximately 282ha (<0.26%), the majority of which (approximately 204.89ha or approximately 73%) is improved agricultural grassland, and of relatively low importance in supporting the breeding hen harrier population of the Slieve Bloom Mountains SPA. Furthermore, habitat

loss impacts would be temporary (up to 18 months) with all of the habitat affected by the pipeline installation works to be reinstated post-construction and reinstated habitat would likely continue to be managed by the landowners in line with its current agricultural use.

1327. The following habitats were recorded within the Proposed Project that are within 10km of the Slieve Bloom Mountains SPA:

- Arable crops (BC1) = 58.19ha
- Tilled land (BC3) = 3.41ha
- Earth banks (BL2) = 0.04ha
- Buildings and artificial surfaces (BL3) = 9.75ha
- Spoil and bare ground (ED2) = 0.04ha
- Recolonising bare ground (ED3) = 0.02ha
- Other artificial lakes and ponds (FL8) = 0.03ha
- Improved agricultural grassland (GA1) = 215.35ha
- Amenity grassland (GA2) = 0.10ha
- Dry calcareous and neutral grassland (GS1) = 1.47ha
- Dry meadows and grassy verges (GS2) = 3.51ha
- Wet grassland (GS4) = 6.23ha
- Cutover bog (PB4) = 1.17ha
- (Mixed) broadleaved woodland (WD1) = 1.45ha
- Mixed broadleaved/conifer woodland (WD2) = 0.78ha
- (Mixed) conifer plantation = 0.03ha
- Conifer plantation (WD4) = 1.20ha
- Oak-ash-hazel woodland (WN2) = 0.13ha
- Wet willow-alder-ash woodland (WN6) = 0.31ha
- Bog woodland (WN7) = 0.21ha
- Scrub (WS1) = 1.6ha
- Short rotation coppice (WS4) = 0.86ha

1328. Given that the habitats affected are generally of low suitability for foraging hen harrier, the temporary nature of the construction works and habitat impacts, and the relatively small area of habitat that would be temporarily affected during the Construction Phase in comparison to the total area surrounding the SPA that remains available to the breeding hen harrier population, there would not be any significant adverse effects on the breeding hen harrier population of the Slieve Bloom Mountains SPA due to habitat impacts.

7.11.3.1.2 Disturbance

1329. Disturbance to nesting hen harrier from construction activities has been recorded at distances of up to 1km (Ruddock and Whitfield 2007) but generally considered to be between 300-750m (Goodship and Furness 2022). The Slieve Bloom Mountains SPA is c.2.5km from the Proposed Project and is therefore beyond the ZoI of any disturbance or displacement effects during the Construction Phase.

1330. As discussed above in relation to habitat impacts, hen harrier range up to 10km from the nest site during the breeding season and the breeding population of the Slieve Bloom Mountains SPA may use habitat

areas in the ZoI of the Proposed Project. Therefore, construction works may result in localised disturbance/displacement effects along the pipeline. However, given that the habitat affected is generally of low suitability for foraging hen harrier, the temporary nature of the construction works, and the abundance of alternative suitable habitat available surrounding the SPA, there would not be any significant adverse effects on the breeding hen harrier population of the Slieve Bloom Mountains SPA due to construction-related disturbance.

7.11.3.2 Summary

1331. Table 7.34 presents a summary of the potential impacts on the special conservation interest species of the Slieve Bloom Mountains SPA as a result of the Proposed Project and how these impacts affect the site's conservation objectives. There are no special conservation interest species from this SPA present within the ZoI of the Proposed Project that could potentially be impacted.

Table 7.34: Special Conservation Interest Species of the Slieve Bloom Mountains SPA and Summary of Potential Impacts

Special Conservation Interests	Potential Impacts	
	Construction Phase	Operational Phase
Annex I Species		
Hen harrier (*Circus cyaneus*) [A082]	No potential for impacts associated with the Proposed Project to result in any significant adverse effects on the breeding hen harrier population of the Slieve Bloom Mountains SPA.	

1332. The specific attributes and targets used to define the conservation objectives of the special conservation interest species of the Slieve Bloom Mountains SPA are presented in Table 7.35, along with the potential impacts associated with the Proposed Project. Those special conservation interests, and the supporting attributes, measures, and targets at risk of being affected by the Proposed Project are highlighted in blue.

Table 7.35: Potential Impacts on the Conservation Objectives of the Slieve Bloom Mountains SPA

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Hen harrier (*Circus cyaneus*) [A082] **To restore the favourable conservation condition of the species in the Slieve Bloom Mountains SPA, which is defined by the following list of attributes and targets:**				
Population size (number of confirmed breeding pairs)	Maintain numbers at or above five to ten confirmed breeding pairs.	No At a distance of 2.5km from the Slieve Bloom Mountains SPA site boundary, the Proposed Project boundary lies just outside the potential core breeding range (2km), but within the normal foraging (10km) range for the SPA's hen harrier population. Despite the relative proximity of the Proposed Project to the Slieve Bloom Mountains SPA, given: • The temporary and localised nature of any construction-related disturbance within the range of the SPA's hen harrier population • The relatively small scale, and temporary nature, of the majority of the habitat loss/disturbance within the range of the SPA's hen harrier population • The relatively small permanent loss of habitat within the range of the SPA's hen harrier population. There are no risks of any significant adverse population effects or a decrease in the numbers or range of areas used by hen harrier either within or outside of the SPA.	No	No potential for effects.
Productivity rate (number of fledged young per confirmed pair)	Restore at least 1.0–1.4 fledged young per confirmed pair.			
Spatial utilisation by breeding pairs (percentage)	Maintain at least 82-97% spatial utilisation of the SPA by breeding pairs.			
Extent and condition of heath and bog and associated habitats (hectares; condition assessment)	Restore the extent and quality of this resource to support the targets relating to population size, productivity rate and spatial utilisation.			
Extent and condition of low intensity managed grasslands and associated habitats (hectares; condition assessment)	Restore the extent and quality of this resource to support the targets relating to population size, productivity rate and spatial utilisation.			
Extent and condition of hedgerows (kilometres; condition assessment)	Maintain at least the length and quality of this resource to support the targets relating to population size, productivity rate and spatial utilisation.			
Age structure of forest estate (percentage)	Achieve an even and consistent distribution of age-classes across the forest estate.			
Disturbance to breeding sites (level of impact)	Disturbance occurs at levels that do not significantly impact upon breeding hen harrier.			

7.11.4 Design Requirements and Mitigation Measures

1333. The positioning of the infrastructure associated with the Proposed Project has been designed to avoid European sites, where possible, and to minimise the risks of indirect effects as far as is possible. The design measures are described in Section 3.5.

1334. Habitat loss impacts associated with installing the pipeline would be temporary as habitat areas directly affected would be reinstated post-construction.

1335. As the Proposed Project would not have any effects on the breeding population of hen harrier in the Slieve Bloom Mountains SPA, mitigation measures are not needed.

7.11.5 Residual Impacts

1336. Although the Proposed Project would result in direct impacts on habitats within the range of breeding hen harrier in the Slieve Bloom Mountains SPA, the majority of habitat types affected are unsuitable to support foraging hen harrier, are beyond the core 2km range of any nest sites within the SPA, and where habitat areas within the wider 10km range of the SPA's hen harrier population would be impacted, the effects would be largely temporary.

1337. There are therefore, no residual direct or indirect impacts associated with the Proposed Project that could adversely affect the integrity of the Slieve Bloom Mountains SPA.

7.11.6 Conclusion of Assessment for Slieve Bloom Mountains SPA 4160

1338. None of the potential direct or indirect impacts associated with the Proposed Project would affect the conservation objectives of the Slieve Bloom Mountains SPA's hen harrier population.

1339. The examination, analysis and evaluation covered all relevant information in respect of the special conservation interest species of the SPA. This included the potential impacts, prevention design measures (e.g. route selection) and whether or not the predicted impacts would affect the conservation objectives that support the conservation condition for the special conservation interest species concerned (either directly or indirectly; refer to Section 8 for the in-combination assessment). It has been concluded beyond reasonable scientific doubt that, the Proposed Project would not adversely affect the integrity of the Slieve Bloom Mountains SPA.

7.12 Lough Derg (Shannon) SPA 4058

7.12.1 Special Conservation Interest Species and Conservation Objectives of Lough Derg (Shannon) SPA 4058

1340. The special conservation interest species of the Lough Derg (Shannon) SPA, and the overall conservation objective for each, are listed in Table 7.36.

Table 7.36: Special Conservation Interests and Conservation Objectives of Lough Derg (Shannon) SPA (NPWS 2024a)

Special Conservation Interests	Conservation Objectives
Cormorant (*Phalacrocorax carbo*) [A017] (Breeding & Wintering)	To restore the favourable conservation condition
Tufted duck (*Aythya fuligula*) [A061] (Wintering)	To maintain the favourable conservation condition
Goldeneye (*Bucephala clangula*) [A067] (Wintering)	To maintain the favourable conservation condition
Common tern (*Sterna hirundo*) [A193] (Breeding)	To restore the favourable conservation condition
Wetlands and Waterbirds [A999]	To maintain the favourable conservation condition

1341. In conjunction with considering the generic conservation objective, to maintain or restore the favourable conservation condition of the Annex I species for which the SPA has been selected, the available site-specific conservation objectives document for the Lough Derg (Shannon) SPA (NPWS 2024a) also informed this assessment. This document sets out the attributes, measures and targets that define the favourable conservation condition of the special conservation interest species within the European site.

7.12.2 Ecological Baseline Description for Lough Derg (Shannon) SPA 4058

1342. Lough Derg lies within Counties Tipperary, Galway and Clare and is the largest of the River Shannon Lakes, being some 40km long. Its maximum breadth across the Scarriff Bay-Youghal Bay transect is 13km but for most of its length it is less than 5km wide. The lake is relatively shallow at the northern end being mostly 6m in depth but in the middle region it has an axial trench and descends to over 25m in places. The narrow southern end of the lake has the greatest average depth, with a maximum of 34m. The greater part of the lake lies on Carboniferous limestone but the narrow southern section is underlain by Silurian strata. Most of the lower part of the lake is enclosed by hills on both sides, the Slieve Aughty Mountains to the west and the Arra Mountains to the east. The northern end is bordered by relatively flat, agricultural country. The lake shows the high hardness levels and alkaline pH to be expected from its mainly limestone catchment basin, and it has most recently been classified as a mesotrophic system. The lake has many small islands, especially on its western and northern sides. The shoreline is often fringed with swamp vegetation. Aquatic vegetation includes a range of charophyte species, including the Red Data Book species, *Chara tomentosa*. The shoreline is often fringed by swamp vegetation, comprising such species as common reed, great fen-sedge and bottle sedge (DAHG 2014c).

1343. Lough Derg is of importance for both breeding and wintering birds. The site supports a nationally important breeding colony of common tern (55 pairs recorded in 1995). Management of one of the islands used for nesting has increased the area of suitable habitat available and prevented nests being destroyed by fluctuating water levels. Large numbers of black-headed gull (2,176 pairs in 1985) have traditionally bred on the many islands but the recent status of this species is not known. The islands in the lake also support a nationally important cormorant colony; 167 pairs were recorded in 1995 and a partial survey of the lake in 2010 recorded 113 pairs. Lough Derg is also a noted breeding site for great crested grebe (47 pairs in 1995) and tufted duck (169 pairs in May 1995) (DAHG 2014c).

1344. In winter, the lake is important for a range of waterfowl species, including nationally important populations of tufted duck (776) and goldeneye (157). All figures are mean peaks for four of the five seasons between 1995/96 and 1999/2000. Other species which occur in winter include mute swan (164), whooper swan (18), wigeon (249), teal (301), mallard (376), little grebe (14), cormorant (90), coot (173), lapwing (922), curlew (66) and black-headed gull (732). Areas to north and south-west of Lough Derg have been utilised in the past by small numbers of Greenland white-fronted goose; 19 geese were recorded on callowland near Portumna in 1996/97. A relatively small flock based in the Lough Derg-Lough Graney area and possibly further afield have been recorded in the Scarriff Bay area – 20 geese recorded in 2004. Few sightings at either location have been made in recent years (DAHG 2014c).

1345. Hen harrier are also known to roost in the reedbeds on the margins of the site during the winter (DAHG 2014c).

1346. Lough Derg (Shannon) SPA is of high ornithological importance as it supports nationally important breeding populations of cormorant and common tern. In winter, it has nationally important populations of tufted duck and goldeneye, as well as a range of other species including whooper swan. The presence of whooper swan, Greenland white-fronted goose, hen harrier and common tern is of particular note as these are listed on Annex I of the Birds Directive. Parts of Lough Derg (Shannon) SPA are a wildfowl sanctuary (DAHG 2014c).

1347. The Proposed Project boundary is located 4km south-east of and does not overlap with this European site. The hydrogeological ZoI of the Proposed Project does not extend to 4km and poses no direct risk of hydrogeological effects within Lough Derg (Shannon) SPA. However, the Proposed Project does cross a number of watercourses that drain to Lough Derg (Shannon) SPA c.4km away, including the Ardgregane Stream, Nenagh River and the Ballyfinboy River (refer to Appendix J: Watercourse Crossings and Pathways to European Sites, for more details and EIAR Figure 8.4 to Figure 8.108 for the locations of the watercourse crossings). The catchments of the Little Brosna River and the Brosna River are also crossed by the Proposed Project and these too would ultimately drain to Lough Derg via the River Shannon.

1348. Cormorant were consistently recorded during the winter months between 2015 and 2023 in various habitats in, and surrounding, Parteen Basin (where the proposed RWI&PS site is located). This species was most often recorded in fringing habitat on the western shore and roosting on the islands within the lake.

1349. Tufted duck and goldeneye were consistently recorded at Parteen Basin during the winter months between 2015 and 2023 in various habitats in, and surrounding, Parteen Basin (where the proposed RWI&PS site is located). These species were most often recorded on open water in the centre of Parteen Basin reservoir and in fringing habitat on the western shore.

1350. In 2015 common tern (maximum count seven adult individuals) were recorded as likely breeding at one location, Goat Island in Lough Derg. Common tern were recorded in limited numbers using Parteen Basin or habitats in the ZoI of the Proposed Project.

1351. Refer to EIAR Appendix A8.21 (Breeding Bird Surveys Summary Report) and EIAR Appendix A8.22 (Winter Bird Surveys Summary Report) for full details of the breeding and wintering bird survey results.

7.12.3 Examination and Analysis of Potential Direct and Indirect Impacts

1352. As the Proposed Project does not overlap with Lough Derg (Shannon) SPA, the habitat supporting the special conservation interests within the SPA would not be directly impacted. Lough Derg (Shannon) SPA (and potential ex-situ sites) also lies beyond the ZoI of any hydrogeological and hydrological impacts, or air quality impacts. At a distance of 4km, the Proposed Project would not disturb or displace wintering birds at Lough Derg (Shannon) SPA. The Operational Phase of the Proposed Project poses no risk of disturbing or displacing wintering birds from the SPA, as none of the habitats within the ZoI of operational activities are important habitats for the wintering birds designated for this SPA.

1353. However, in the absence of mitigation measures, the Proposed Project's impacts described in the following sections could potentially affect the conservation objective attributes and targets supporting the conservation condition of the special conservation interest bird populations of the Lough Derg (Shannon) SPA.

7.12.3.1 Construction Phase

7.12.3.1.1 Habitat degradation as a Result of Excavation and Tunnelling

1354. The only influence tunnelling or excavation works associated with the Proposed Project could have on Lough Derg (Shannon) SPA is indirectly during the pipeline installation works at the watercourse crossings, where there is a risk of water quality impacts in the receiving watercourses regardless of whether open cut or trenchless techniques are used. This is discussed further below in the hydrological impacts section.

7.12.3.1.2 Habitat degradation as a Result of Hydrological Impacts/Water Quality Impacts

1355. Hydrostatic pressure testing would be carried out on the Treated Water Pipelines. It is proposed to abstract water from eight water bodies along the route and use the abstracted 'test water' to pressure test the pipeline (Section 5.1.2.2). This water would then be discharged through the use of washouts to land or to water bodies, or tankered away where required. In addition, there are a total of 51 Line Valves along the pipeline route. Two of these are located on the RWRMs and the other 49 are located along the Treated Water Pipeline. The two Line Valves on the RWRMs would not have washouts. Twenty of the 49 Line Valves along the Treated Water Pipeline would have washouts. Washouts at Line Valves would only be used to discharge the sweetening flows during final filling in the Commissioning Phase and the washout design flow would vary between 1l/s and 4l/s. The water used to test the pipeline would be released via one of these 20 Line Valve Washouts. These are detailed in Annex A (Water Body Crossings and Washout Valves – Detailed Assessment) of EIAR Appendix A9.2 (Pipeline Assessment). Such activities in the ZoI of the Lough Derg (Shannon) SPA or its tributaries may affect water quality in the European site and has the potential to affect the conservation objectives supporting the special conservation interest species and habitats hydrologically linked to the European site. Mitigation measures are detailed in Section 7.1.4.3.

1356. As the Proposed Project crosses watercourses that drain to Lough Derg (Shannon) SPA, construction works at these watercourse crossings pose a risk of affecting water quality in the European site through an accidental spillage of cement-based products or accidental spillage of hydrocarbons.

1357. Affecting water quality in receiving watercourses and in Lough Derg (Shannon) SPA has the potential to affect the conservation objectives supporting the conservation condition of the special conservation interest bird populations of Lough Derg (Shannon) SPA.

7.12.3.1.3 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1358. As the Proposed Project would involve instream construction works on watercourses that drain to Lough Derg (Shannon) SPA, there is the potential that INNS could be introduced to the surface water network and establish populations downstream in the European site.

1359. Introducing INNS to Lough Derg (Shannon) SPA has the potential to affect the quality of the wetland habitat that supports the conservation condition of the special conservation interest bird populations of Lough Derg (Shannon) SPA.

7.12.3.1.4 Habitat Loss and Disturbance Impacts Outside of the SPA Boundary

1360. Three of the special conservation interest species of Lough Derg (Shannon) SPA were regularly recorded using Parteen Basin and the associated fringing aquatic habitats: cormorant, tufted duck and goldeneye. There is no information or evidence to confirm whether any of these bird species recorded in Parteen Basin are birds from the special conservation interest populations of Lough Derg (Shannon) SPA. However, given the close proximity of Parteen Basin to Lough Derg (Parteen Basin is only 2.5km further downstream) a precautionary approach is being taken in assuming that they are. None of these species were recorded using habitat within the footprint of the proposed construction works. The majority of observations were of birds using the western (more natural) side of Parteen Basin rather than the eastern (man-made) embankment, where the RWI&PS is located. Common tern typically nest on flat poorly vegetated surfaces close to water including beaches; cormorant typically nest in colonies on the coast but some nest inland in trees; tufted duck nest in waterside vegetation. The aquatic and terrestrial habitat at the RWI&PS site (as described in Section 7.1.2.1) does not provide adequate cover and is not considered to be suitable breeding habitat for any of the special conservation interest species. It is likely these species may occasionally use the RWI&PS for foraging purposes only.

1361. The total area of Parteen Basin is 360ha, and the construction of the RWI&PS would result in the loss of c.0.6ha of lake habitat. This represents a loss of 0.15% of the area of Parteen Basin. To put this into context of the area of habitat within Lough Derg (Shannon) SPA that supports the special conservation interest populations, it represents c.0.004%. The loss of a habitat area this small, outside of the boundary of Lough Derg (Shannon) SPA, would not have any effect on habitat availability or prey abundance that would affect population numbers.

1362. Disturbance during the Construction Phase has the potential to disturb and displace birds using Parteen Basin for a distance of up to 150m from the works area (see Section 5.1.3.4 for rationale supporting the quoted 150m disturbance distance). However, any potential disturbance impacts would be temporary and short term (up to 18 months) and would not have any adverse effects on bird usage of Parteen Basin. The Operational Phase of the Proposed Project would not result in any disturbance or displacement effects on wintering or breeding birds using Parteen Basin.

1363. Given the temporary nature of the construction works, and the relatively small area of habitat that would be lost and temporarily affected during the Construction Phase by disturbance compared to the total area available to the bird populations within the SPA, there would not be any adverse effects on the breeding or wintering bird populations of the Lough Derg (Shannon) SPA due to either habitat loss impacts or disturbance effects during the Construction Phase.

7.12.3.2 Operational Phase

7.12.3.2.1 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1364. Although there would not be any routine discharges to the surface water network during the Operational Phase, Washout Valves would be located along the pipeline to facilitate planned repair and maintenance works (every 20-25 years). The water would be dechlorinated before discharge using dechlorination chemicals and there is therefore a risk to water quality in receiving watercourses from accidental chemical spills from the Siltbuster mobile treatment unit (Section 7.1.4.3). Repair and maintenance works may require excavations to repair or replace sections of pipeline which pose a risk of affecting water quality in the surface water network.

1365. Affecting water quality in receiving watercourses and in the Lough Derg (Shannon) SPA has the potential to affect the conservation objectives supporting the conservation condition of the special conservation interest bird populations of Lough Derg (Shannon) SPA.

1366. The hydrological and water quality models demonstrate the Proposed Project would abstract approximately 2% of the annual mean volume of flow at Parteen Basin, and 2.3% of water is currently used for hydropower from Parteen Basin. The natural volumetric range of flow in Parteen Basin, with wet and dry years, is approximately ± 30% about the mean in a 25-year period of record. Thus, there would be no significant effect on water levels and the flow regime either upstream or downstream of the Proposed Project over such a wide range of natural variation. Therefore, the proposed abstraction is not anticipated to have any effect on water levels in either Lough Derg or Parteen Basin and would not affect wetland habitats or the special conservation interest species of Lough Derg (Shannon) SPA (see Section 7.1.3.2 for full discussion on operational effects on water levels in the receiving environment).

7.12.3.2.2 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1367. During the Operational Phase, repair and maintenance works may be required to sections of the pipeline within the Proposed Project, which cross watercourses that drain to Lough Derg (Shannon) SPA. There is a risk that plant INNS may colonise lands within the 20m wide Permanent Wayleave post-construction and therefore, a risk that repair and maintenance works could potentially introduce INNS to the surface water network and establish populations downstream in the European site.

1368. Introducing INNS to Lough Derg (Shannon) SPA has the potential to affect the quality of the wetland habitat that supports the conservation condition of the special conservation interest bird populations of Lough Derg (Shannon) SPA.

7.12.3.3 Summary

1369. Table 7.37 presents a summary of the potential impacts on the special conservation interest species of the Lough Derg (Shannon) SPA as a result of the Proposed Project and how these impacts affect the site's conservation objectives. Those highlighted in blue are the special conservation interest species which are present within the ZoI of the Proposed Project that could potentially be impacted.

Table 7.37: Special Conservation Interest Species of the Lough Derg (Shannon) SPA and Summary of Potential Impacts

Special Conservation Interests	Potential Impacts	
	Construction Phase	Operational Phase
Cormorant (*Phalacrocorax carbo*) [A017] (Breeding & Wintering)	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
Tufted duck (*Aythya fuligula*) [A061] (Wintering)		
Goldeneye (*Bucephala clangula*) [A067] (Wintering)		
Common tern (*Sterna hirundo*) [A193] (Breeding)		
Wetlands [A999]		

1370. The specific attributes and targets used to define the conservation objectives of the special conservation interest species of the Lough Derg (Shannon) SPA are presented in Table 7.38, along with the potential impacts associated with the Proposed Project. Those special conservation interests, and the supporting attributes, measures, and targets at risk of being affected by the Proposed Project are highlighted in blue.

Table 7.38: Potential Impacts on the Conservation Objectives of the Lough Derg (Shannon) SPA

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Cormorant (*Phalacrocorax carbo*) [A017] (Breeding & Wintering) **To restore the favourable conservation condition of the species in the Lough Derg (Shannon) SPA, which is defined by the following list of attributes and targets:**				
Breeding population size (apparently occupied nests (AONs): number)	Long-term SPA population trend is stable or increasing.	Yes The Lough Derg (Shannon) SPA site boundary lies more than 4km from where the Proposed Project crosses watercourses that drain to this SPA. An accidental pollution event during the Construction Phase, of a sufficient magnitude, could potentially have significant adverse effects on aquatic habitats in the SPA. A reduction in water quality in Lough Derg could affect factors that support the breeding population, such as prey abundance/biomass. Such impacts could potentially affect nest occupation and productivity which in turn could affect the number and range of areas used by cormorant and the population numbers in the SPA.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on habitats in Lough Derg (Shannon) SPA are avoided (Section 7.12.4).	No potential for effects, following the implementation of mitigation measures.
Productivity rate (number of fledged young per AON)	Sufficient to maintain a stable or increasing population.			
Forage spatial distribution, extent, abundance and availability (location and hectares, and forage biomass)	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target.			
Distribution: extent of available nesting options within SPA (numbers and spatial distribution)	Sufficient availability of suitable nesting sites throughout the SPA to maintain a stable or increasing population.	No Although the Proposed Project is hydrologically connected to Lough Derg (i.e. it crosses watercourses that drain to this SPA), it lies more than 4km away from and upstream of the Lough Derg (Shannon) SPA and poses no risk of directly, or indirectly, affecting the number, location or area of breeding colonies as cormorant nest on islands on the lake.	No	No potential for effects.
Barriers to connectivity (number; location; shape; area (hectares))	No significant increase.	No Watercourses crossed by the Proposed Project that drain to this SPA are crossed by the pipeline corridor more than 4km away from and upstream of the Lough Derg (Shannon) SPA. This poses no risk of barrier effect to bird species or risk of disturbing breeding sites in the SPA.	No	No potential for effects.
Disturbance at breeding site (intensity, frequency, timing and duration)	Disturbance occurs at levels that do not significantly impact on birds at the breeding site.			
Disturbance at areas ecologically connected to the colony ((intensity, frequency, timing and duration)	Disturbance occurs at levels that do not significantly impact on breeding population.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Tufted duck (*Aythya fuligula*) [A061] (Breeding & Wintering) **To maintain the favourable conservation condition of the species in the Lough Derg (Shannon) SPA, which is defined by the following list of attributes and targets:**				
Winter population trend (percentage change in number of individuals)	Long-term winter population trend is stable or increasing.	Yes The Lough Derg (Shannon) SPA site boundary lies more than 4km from where the Proposed Project crosses watercourses that drain to this SPA. An accidental pollution event during the Construction Phase, of a sufficient magnitude, could potentially have significant adverse effects on aquatic habitats in the SPA. A reduction in water quality in Lough Derg could affect factors that support the breeding population, such as prey abundance/biomass. Such impacts could potentially affect nest occupation and productivity which in turn could affect the number and range of areas used by cormorant and the population numbers in the SPA.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on habitats in Lough Derg (Shannon) SPA are avoided (Section 7.12.4).	No potential for effects, following the implementation of mitigation measures.
Winter spatial distribution (hectares, time and intensity of use)	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target.			
Disturbance at wintering site (intensity, frequency, timing and duration)	Disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution.			
Barriers to connectivity and site use (number, location, shape and hectares)	Barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA.	No Watercourses crossed by the Proposed Project that drain to this SPA, are crossed by the pipeline corridor more than 4km away from and upstream of the Lough Derg (Shannon) SPA. This poses no risk of barrier effect to bird species or risk of disturbing breeding sites in the SPA.	No	No potential for effects.
Forage spatial distribution, extent and abundance (location, hectares, and forage biomass)	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target.	Yes The Lough Derg (Shannon) SPA site boundary lies more than 4km from where the Proposed Project crosses watercourses that drain to this SPA. An accidental pollution event during the Construction Phase, of a sufficient magnitude, could potentially have significant adverse effects on aquatic habitats in the SPA. A reduction in water quality in Lough Derg could affect factors that support the breeding population, such as prey abundance/biomass. Such impacts could potentially affect nest occupation and productivity which in turn could affect the number and range of areas used by cormorant and the population numbers in the SPA.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on habitats in Lough Derg (Shannon) SPA are avoided (Section 7.12.4).	No potential for effects, following the implementation of mitigation measures.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Roost spatial distribution and extent (location and hectares of roosting habitat)	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target.	No Watercourses crossed by the Proposed Project that drain to this SPA, are crossed by the pipeline corridor more than 4km away from and upstream of the Lough Derg (Shannon) SPA. This poses no risk to roost distribution and extent to bird species in the SPA.	No	No potential for effects.
Goldeneye (*Bucephala clangula*) [A067] (Wintering) **To maintain the favourable conservation condition of the species in the Lough Derg (Shannon) SPA, which is defined by the following list of attributes and targets:**				
Winter population trend (percentage change in number of individuals)	Long-term winter population trend is stable or increasing.	Yes The Lough Derg (Shannon) SPA site boundary lies more than 4km from where the Proposed Project crosses watercourses that drain to this SPA. An accidental pollution event during the Construction Phase, of a sufficient magnitude, could potentially have significant adverse effects on aquatic habitats in the SPA. This could potentially affect the quality of the aquatic/wetland habitat that supports these special conservation interest species in the Lough Derg (Shannon) SPA, which in turn could affect the range, timing and intensity of use of areas by these species.	Yes Measures to prevent the spread of INNS would be implemented to ensure they are not introduced to Lough Derg (Shannon) SPA (Section 7.12.4). Measures to maintain water quality in receiving watercourses during the Construction Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on habitats in Lough Derg (Shannon) SPA are avoided (Section 7.12.4).	No potential for effects, following the implementation of mitigation measures.
Winter spatial distribution (hectares, time and intensity of use)	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target.			
Disturbance at wintering site (intensity, frequency, timing and duration)	Disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution.			
Barriers to connectivity and site use (number, location, shape and hectares)	Barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA.	No Watercourses crossed by the Proposed Project that drain to this SPA, are crossed by the pipeline corridor more than 4km away from and upstream of the Lough Derg (Shannon) SPA. This poses no risk of barrier effect to bird species or risk of disturbing breeding sites in the SPA.	No	No potential for effects.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Forage spatial distribution, extent and abundance (location, hectares, and forage biomass)	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target.	Yes The Lough Derg (Shannon) SPA site boundary lies more than 4km from where the Proposed Project crosses watercourses that drain to this SPA. An accidental pollution event during the Construction Phase, of a sufficient magnitude, could potentially have significant adverse effects on aquatic habitats in the SPA. This could potentially affect the quality of the aquatic/wetland habitat that supports these special conservation interest species in the Lough Derg (Shannon) SPA, which in turn could affect the range, timing and intensity of use of areas by these species.	Yes Measures to prevent the spread of INNS would be implemented to ensure they are not introduced to Lough Derg (Shannon) SPA (Section 7.12.4). Measures to maintain water quality in receiving watercourses during the Construction Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on habitats in Lough Derg (Shannon) SPA are avoided (Section 7.12.4).	No potential for effects, following the implementation of mitigation measures.
Roost spatial distribution and extent (location and hectares of roosting habitat)	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target.	No Watercourses crossed by the Proposed Project that drain to this SPA, are crossed by the pipeline corridor more than 4km away from and upstream of the Lough Derg (Shannon) SPA. This poses no risk to roost distribution and extent to bird species in the SPA.	No	No potential for effects.
Common Tern (*Sterna hirundo*) [A193] (Breeding) **To restore the favourable conservation condition of the species in the Lough Derg (Shannon) SPA, which is defined by the following list of attributes and targets:**				
Breeding population abundance Number of Apparently Occupied Nests (AON))	Long-term SPA population trend is stable or increasing.	Yes The Lough Derg (Shannon) SPA site boundary lies more than 4km from where the Proposed Project crosses watercourses that drain to this SPA. An accidental pollution event during the Construction Phase, of a sufficient magnitude, could potentially have significant adverse effects on aquatic habitats in the SPA. A reduction in water quality in Lough Derg could affect factors that support the breeding population, such as prey abundance/biomass. Such impacts could potentially affect nest occupation and productivity which in turn could affect the number and range of areas used by common tern and the population numbers in the SPA.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on habitats in Lough Derg (Shannon) SPA are avoided (Section 7.12.4).	No potential for effects, following the implementation of mitigation measures.
Productivity rate (Number of fledged young per AON)	Sufficient to maintain a stable or increasing population.			
Distribution: extent of available nesting options within the SPA (numbers and spatial distribution)	Sufficient availability of suitable nesting sites throughout the SPA to maintain a stable or increasing population.	No Suitable nesting habitat for this species is predominantly concentrated to Goat Island. The Proposed Project is more than 4km away from and upstream of the Lough Derg (Shannon) SPA and poses no risk to the extent of nesting options for this species in the SPA.	No	No potential for effects.

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Forage spatial distribution, extent, abundance and availability (Location and hectares, and forage biomass)	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target.	Yes The Lough Derg (Shannon) SPA site boundary lies more than 4km from where the Proposed Project crosses watercourses that drain to this SPA. An accidental pollution event during the Construction Phase, of a sufficient magnitude, could potentially have significant adverse effects on aquatic habitats in the SPA. A reduction in water quality in Lough Derg could affect factors that support the breeding population, such as prey abundance/biomass. Such impacts could potentially affect nest occupation and productivity which in turn could affect the number and range of areas used by common tern and the population numbers in the SPA.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on habitats in Lough Derg (Shannon) SPA are avoided (Section 7.12.4).	No potential for effects, following the implementation of mitigation measures.
Disturbance at breeding site (Intensity, frequency, timing and duration)	Disturbance occurs at levels that do not significantly impact on birds at the breeding site.	No Suitable nesting habitat for this species is predominantly concentrated to Goat Island. The Proposed Project is more than 4km away from and upstream of the Lough Derg (Shannon) SPA and poses no risk to disturbance at breeding sites and/or ecologically connected sites for this species in the SPA.	No	No potential for effects.
Disturbance at areas ecologically connected to the colony (Intensity, frequency, timing and duration)	Disturbance occurs at levels that do not significantly impact on breeding population.			
Barriers to connectivity (Number; location; shape; area (hectares))	No significant increase.	No Watercourses crossed by the Proposed Project that drain to this SPA, are crossed by the pipeline corridor more than 4km away from and upstream of the Lough Derg (Shannon) SPA. This poses no risk of barrier effect to bird species or risk of disturbing breeding sites in the SPA.	No	No potential for effects.
Wetlands A999 **To maintain the Favourable conservation condition of Wetland habitats in Lough Derg (Shannon) SPA as a resource for the regularly occurring migratory waterbirds that utilise these areas. This is defined by the following list of attributes and targets:**				
Wetland habitat area (Hectares)	No significant loss to wetland habitat within the SPA, other than that occurring from natural patterns of variation.	Yes The Lough Derg (Shannon) SPA site boundary lies more than 4km from where the Proposed Project crosses watercourses that drain to this SPA. An accidental pollution event during the Construction Phase, of a sufficient magnitude, could potentially have significant adverse effects on aquatic habitats in the SPA. A reduction in water quality in Lough Derg could negatively impact the regularly occurring migratory waterbirds that utilise this wetland habitat.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on habitats in Lough Derg (Shannon) SPA are avoided (Section 7.12.4).	No potential for effects, following the implementation of mitigation measures.
Wetland habitat quality and functioning (Quality and function of the wetland habitat)	No significant impact on the quality or functioning of the wetland habitat within the SPA, other than that occurring from natural patterns of variation.			

7.12.4 Design Requirements and Mitigation Measures

1371. The positioning of the infrastructure associated with the Proposed Project has been designed to avoid European sites, where possible, and to minimise the risks of indirect effects as far as is possible. The design measures to avoid or reduce the environmental effects of the Proposed Project are described in Section 3.5.

7.12.4.1 Construction Phase Mitigation

1372. Lough Derg (Shannon) SPA lies approximately 4.1km north of the Proposed Project. At this distance the Proposed Project poses no risk of affecting breeding success at the nesting sites within the SPA. There is no information or evidence to confirm whether any of these bird species recorded in Parteen Basin are birds from the special conservation interest populations of Lough Derg (Shannon) SPA. However, given the close proximity of Parteen Basin to Lough Derg a precautionary approach is being taken in assuming that they are (i.e. Parteen Basin could be a possible ex-situ site for the Lough Derg (Shannon) SPA). None of these species were recorded using habitat within the footprint of the proposed construction works. Nonetheless, vegetation clearance will generally be avoided between 1 March and 31 August 31, to avoid impacts on potential nesting birds. It is recognised that the construction works are to be phased, hence vegetation clearance will not be undertaken across the entire Proposed Project in one operation but will be targeted based on appropriate working areas that can be controlled and managed. Where the construction programme or conflicting mitigation does not allow this seasonal restriction to be observed, these areas will be inspected by an ECoW for the presence of breeding birds prior to clearance. Where nests are present, the ECoW will mark out a suitable buffer zone around an active nest and clearance within this area will be postponed until the chicks have fledged. A suitable buffer zone will be established depending on the species identified. Areas found not to contain nests will be cleared within three days of the inspection; otherwise, repeat inspections will be required. If vegetation is to be cleared in the breeding season (under supervision of an ECoW) it will be chipped, removed or covered (ideally) on the same day to prevent birds from nesting.

1373. The mitigation measures to protect water quality in the receiving environment during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example: the use of sandbags, silt curtains or similar barriers, buffers of natural uncleared vegetation, and suspension of works within and adjacent to watercourses during periods of heavy rainfall. Such mitigation measures are considered best practice and are in accordance with IFI (2016) guidelines.

1374. The mitigation measures to ensure that INNS are not spread or introduced to Lough Derg (Shannon) SPA during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example, the thorough cleaning of plant and equipment using a power washer unit prior to leaving site, in accordance with the OPW Environmental Standard Operating Procedures (OPW 2011) and/or IFI Biosecurity Protocols (IFI 2010).

7.12.4.2 Operational Phase Mitigation

1375. The mitigation measures to protect water quality in the receiving environment during the Operational Phase are similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

1376. The mitigation measures to ensure that INNS are not spread or introduced to the Lough Derg (Shannon) SPA during the Operational Phase are also similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

7.12.5 Residual Impacts

1377. The Proposed Project has the potential to negatively affect water quality in the receiving surface water environment during the Construction Phase and the Operational Phase and, as watercourses crossed by the Proposed Project drain to the River Shannon and Lough Derg, there is the potential for the conservation objectives of Lough Derg (Shannon) SPA to be negatively affected. Mitigation measures will be implemented to ensure that the receiving surface water network is protected and the conservation objectives of Lough Derg (Shannon) SPA are not negatively affected by the Proposed Project.

1378. The Proposed Project has the potential to spread and introduce INNS to Lough Derg (Shannon) SPA via the surface water network, which drains to Lough Derg (Shannon) SPA. Mitigation measures will be implemented to ensure that any INNS present within the Construction Working Width or the 20m wide Permanent Wayleave are controlled and are not spread to Lough Derg (Shannon) SPA, and that the conservation objectives of Lough Derg (Shannon) SPA are not negatively affected by the Proposed Project.

1379. Therefore, there are no residual direct or indirect impacts associated with the Proposed Project that could adversely affect the integrity of Lough Derg (Shannon) SPA.

7.12.6 Conclusion of Assessment for Lough Derg (Shannon) SPA 4058

1380. None of the potential direct or indirect impacts associated with the Proposed Project would affect the conservation objectives of the special conservation interests of Lough Derg (Shannon) SPA. Mitigation measures are included to ensure that water quality in the receiving surface water environment is protected and that INNS are not spread or introduced to Lough Derg (Shannon) SPA.

1381. The examination, analysis and evaluation covered all relevant information in respect of the special conservation interest species of the SPA. This included the potential impacts, mitigation and prevention measures and whether or not the predicted impacts would affect the conservation objectives that support the conservation condition for the special conservation interest species concerned (either directly or indirectly; refer to Section 8 for the in-combination assessment). It has been concluded beyond reasonable scientific doubt that, subject to the implementation of mitigation measures, the Proposed Project would not adversely affect the integrity of the Lough Derg (Shannon) SPA.

7.13 Dovegrove Callows SPA 4137

7.13.1 Special Conservation Interest Species and Conservation Objectives of Dovegrove Callows SPA 4137

1382. The special conservation interest species of Dovegrove Callows SPA, and the overall conservation objective for it, is presented in Table 7.39.

Table 7.39: Special Conservation Interest Species and Conservation Objectives of Dovegrove Callows SPA (NPWS 2025d)

Special Conservation Interests	Conservation Objectives
Greenland white-fronted goose (*Anser albifrons flavirostris*) [A395] (Wintering)	To restore favourable conservation condition of the bird species

1383. In conjunction with considering the generic conservation objective, to maintain or restore the favourable conservation condition of the Annex I species for which the SPA has been selected, the available site-specific conservation objectives document for the Dovegrove Callows SPA (NPWS, 2025d) also informed this assessment. This document sets out the attributes, measures and targets that define the favourable conservation condition of the special conservation interest species within the European site. Ecological Baseline Description for Dovegrove Callows SPA 4137.

1384. Dovegrove Callows SPA is an area of callowland beside the Little Brosna River 2km downstream from Birr, County Offaly and 5km upstream from the start of the main area of River Little Brosna callows. The main habitat is wet grassland which floods (DAHG 2011).

1385. The site is of major conservation significance as an important feeding area for the internationally important Little Brosna Greenland white-fronted goose flock (527 individuals – five year mean peak for the period 1994/95 to 1998/99), a species that is listed on Annex I of the Birds Directive. The site is used on an occasional basis when other feeding sites along the Middle Shannon and Little Brosna callows are flooded. It is of particular importance as it can support the entire Little Brosna flock. For this reason, the site is a key part of this flock's winter range and important for its protection (DAHG 2011).

1386. The Proposed Project boundary is located 7km south-east of Dovegrove Callows SPA site boundary and does not overlap with this European site. The hydrogeological ZoI of the Proposed Project does not extend to 7km and poses no risk of hydrogeological effects within Dovegrove Callows SPA. However, the Proposed Project does cross a number of watercourses that drain to Dovegrove Callows SPA more than 7km away, including: the Little Brosna River (WCX026), the Rock [Birr] River (WCX027), the Breaghmore River (WCX031) and the Camcor River (WCX032) (refer to Appendix J: Watercourse Crossings and Pathways to European Sites, for more details and EIAR Figure 8.4 to Figure 8.108 for the locations of the watercourse crossings).

7.13.2 Examination and Analysis of Potential Direct and Indirect Impacts

1387. As the Proposed Project does not overlap with Dovegrove Callows SPA, the Greenland white-fronted goose habitat within the SPA would not be directly impacted. Dovegrove Callows SPA (and potential ex-situ sites) also lies beyond the ZoI of any hydrogeological, hydrological impacts or air quality impacts. At a distance of 7km, the Proposed Project would not disturb or displace Greenland white-fronted geese at Dovegrove Callows SPA. The Operational Phase of the Proposed Project poses no risk of disturbing or displacing Greenland white-fronted geese from the SPA, as none of the habitats within the ZoI of operational activities are suitable habitats for Greenland white-fronted geese.

1388. Greenland white-fronted geese return to the same winter-feeding grounds year after year and, as would be expected for such a site-faithful species, they were not recorded in the study area of the Proposed Project during the winter bird surveys. Therefore, the Proposed Project would not result in any impacts to the Greenland white-fronted goose population of Dovegrove Callows SPA outside of the SPA site.

1389. However, in the absence of mitigation measures, the Proposed Project's impacts described in the following sections could potentially affect the conservation objective attributes and targets supporting the conservation condition of the Greenland white-fronted goose population of the Dovegrove Callows SPA.

7.13.2.1 Construction Phase

7.13.2.1.1 Habitat Degradation as a Result of Excavation and Tunnelling

1390. The only influence tunnelling or excavation works associated with the Proposed Project could have on Dovegrove Callows SPA is indirectly during the pipeline installation works at the watercourse crossings, where there is a risk of water quality impacts in the receiving watercourses regardless of whether open cut or trenchless techniques are used. This is discussed further below in the hydrological impacts section.

7.13.2.1.2 Habitat Degradation as a Result of Hydrological Impacts/ Water Quality Impacts

1391. Hydrostatic pressure testing would be carried out on the Treated Water Pipelines. It is proposed to abstract water from eight water bodies along the route and use the abstracted 'test water' to pressure test the pipeline (Section 5.1.2.2). This water would then be discharged through the use of washouts to land or to water bodies, or tankered away where required. In addition, there are a total of 51 Line Valves along the pipeline route. Two of these are located on the RWRMs and the other 49 are located along the Treated Water Pipeline. The two Line Valves on the RWRMs would not have washouts. Twenty of the 49 Line Valves along the Treated Water Pipeline would have washouts. Washouts at Line Valves would only be used to discharge the sweetening flows during final filling in the Commissioning Phase and the washout design flow would vary between 1l/s and 4l/s. The water used to test the pipeline would be released via one of these 20 Line Valve Washouts. These are detailed in Annex A (Water Body Crossings and Washout Valves – Detailed Assessment) of EIAR Appendix A9.2 (Pipeline Assessment). Such activities in the ZoI of the Dovegrove Callows SPA or its tributaries may affect water quality in the European site and has the potential to affect the conservation objectives supporting the special conservation interest species and habitats hydrologically linked to the European site. Mitigation measures are detailed in Section 7.1.4.3.

1392. As the Proposed Project crosses watercourses that drain to Dovegrove Callows SPA, construction works at these watercourse crossings pose a risk of affecting water quality in the European site through an accidental spillage of cement-based products or accidental spillage of hydrocarbons.

1393. Affecting water quality in receiving watercourses and in Dovegrove Callows SPA has the potential to affect the conservation objectives supporting the conservation condition of the special conservation interest Greenland white-fronted goose population of Dovegrove Callows SPA.

7.13.2.1.3 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1394. As the Proposed Project would involve instream construction works on watercourses that drain to Dovegrove Callows SPA, there is the potential that INNS could be introduced to the surface water network and establish populations downstream in the European site.

1395. Introducing INNS to Dovegrove Callows SPA has the potential to affect the quality of the wetland habitat that supports the conservation condition of the special conservation interest Greenland white-fronted goose population of Dovegrove Callows SPA.

7.13.2.2 Operational Phase

7.13.2.2.1 Habitat Degradation as a Result of Hydrological Impacts/ Water Quality Impacts

1396. Although there would not be any routine discharges to the surface water network during the Operational Phase, Washout Valves would be located along the pipeline to facilitate planned repair and maintenance works (every 20-25 years). The water would be dechlorinated before discharge using dechlorination chemicals and there is therefore a risk to water quality in receiving watercourses from accidental chemical spills from the Siltbuster mobile treatment unit (Section 7.1.4.3). Repair and maintenance works may require excavations to repair or replace sections of pipeline which pose a risk of affecting water quality in the surface water network.

1397. Affecting water quality in receiving watercourses and in Dovegrove Callows SPA has the potential to affect the conservation objectives supporting the conservation condition of the special conservation interest Greenland white-fronted goose population of Dovegrove Callows SPA.

7.13.2.2.2 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1398. During the Operational Phase, repair and maintenance works may be required to sections of the pipeline within the Proposed Project, which cross watercourses that drain to Dovegrove Callows SPA. There is a risk that plant INNS may colonise lands within the 20m wide Permanent Wayleave post-construction and therefore, a risk that repair and maintenance works could potentially introduce INNS to the surface water network and establish populations downstream in the European site.

1399. Introducing INNS to Dovegrove Callows SPA has the potential to affect the quality of the wetland habitat that supports the conservation condition of the special conservation interest Greenland white-fronted goose population of Dovegrove Callows SPA.

7.13.2.3 Summary

1400. Table 7.40 presents a summary of the potential impacts on the special conservation interest species of the Dovegrove Callows SPA as a result of the Proposed Project and how these impacts affect the site's conservation objectives. Those highlighted in blue are the special conservation interest species which are present within the ZoI of the Proposed Project that could potentially be impacted.

Table 7.40: Special Conservation Interest Species of the Dovegrove Callows SPA and Summary of Potential Impacts

Special Conservation Interests	Potential Impacts	
	Construction Phase	Operational Phase
Annex I Species		
Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395] (Wintering)	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS

1401. The specific attributes and targets used to define the conservation objectives of the special conservation interest species of the Dovegrove Callows SPA are presented in Table 7.41, along with the potential impacts associated with the Proposed Project. Those special conservation interests, and the supporting attributes, measures, and targets at risk of being affected by the Proposed Project are highlighted in blue.

Table 7.41: Potential Impacts on the Conservation Objectives of the Dovegrove Callows SPA

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Greenland white-fronted goose (*Anser albifrons flavirostris*) [A395] (Wintering) **To restore the favourable conservation condition of the species in the Dovegrove Callows SPA, which is defined by the following list of attributes and targets:**				
Winter population trend (percentage change in number of individuals)	Long-term winter population trend is stable or increasing.	Yes Dovegrove Callows SPA site boundary lies more than 7km from where the Proposed Project crosses watercourses that drain to this SPA. An accidental pollution event during the Construction Phase, of a sufficient magnitude, could potentially have significant adverse effects on wetland habitats in the SPA. Although unlikely, given the SPA is more than 7km from the Proposed Project, there remains a risk that INNS capable of colonising wetland habitats could be spread, via the surface water network, to the Dovegrove Callows SPA. These impacts could potentially adversely affect the quality of the wetland habitat that supports Greenland white-fronted geese in the Dovegrove Callows SPA, which in turn could affect the number and range of areas used by the geese and population numbers.	Yes Measures to prevent the spread of INNS would be implemented to ensure they are not introduced to Dovegrove Callows SPA (Section 7.13.3). Measures to maintain water quality in receiving watercourses during the Construction Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on habitats in Dovegrove Callows SPA are avoided (Section 7.13.3).	No potential for effects, following the implementation of mitigation measures.
Winter spatial distribution (hectares, time and intensity of use)	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target.			
Forage spatial distribution, extent and abundance (location, hectares, and forage biomass)	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target.			
Supporting habitat: area and quality (hectares and quality)	Sufficient area of utilisable habitat available in ecologically important sites outside the SPA.			
Disturbance at wintering site (intensity, frequency, timing and duration)	Disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution.	No At a distance of 7km from the Proposed Project boundary there is no potential for disturbance effects on Greenland white-fronted goose within the SPA. The Proposed Project would not cause a barrier to connectivity. The majority of elements to the Proposed Project would be located underground or of such a low profile, relative to the surrounding area not to cause obstruction to commuting Greenland white-fronted goose from the SPA. There are no risks to overnight roosting sites used by Greenland white-fronted goose. No suitable permanent water bodies such as lakes or estuaries suitable for roosting are located within or immediately adjacent to the Proposed Project and within commuting distance to the SPA.	No	No potential for effects.
Barriers to connectivity and site use (number, location, shape and hectares)	Barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA.			
Roost spatial distribution and extent (location and hectares of roosting habitat)	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target.			

7.13.3 Design Requirements and Mitigation Measures

1402. The positioning of the infrastructure associated with the Proposed Project has been designed to avoid European sites, where possible, and to minimise the risks of indirect effects as far as is possible. The design measures are described in Section 3.5.

7.13.3.1 Construction Phase Mitigation

1403. The mitigation measures to protect water quality in the receiving environment during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example, the use of sandbags, silt curtains or similar barriers, buffers of natural uncleared vegetation, and suspension of works within and adjacent to watercourses during periods of heavy rainfall. Such mitigation measures are considered best practice and are in accordance with IFI (2016) guidelines.

1404. The mitigation measures to ensure that INNS are not spread or introduced to Dovegrove Callows SPA during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example, the thorough cleaning of plant and equipment using a power washer unit prior to leaving site, in accordance with the OPW Environmental Standard Operating Procedures (OPW 2011) and/or IFI Biosecurity Protocols (IFI 2010).

7.13.3.2 Operational Phase Mitigation

1405. The mitigation measures to protect water quality in the receiving environment during the Operational Phase are similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

1406. The mitigation measures to ensure that INNS are not spread or introduced to Dovegrove Callows SPA during the Operational Phase are also similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

7.13.4 Residual Impacts

1407. The Proposed Project has the potential to negatively affect water quality in the receiving surface water environment during the Construction Phase and the Operational Phase and, as watercourses crossed by the Proposed Project drain to the Little Brosna River, there is the potential for the conservation objectives of Dovegrove Callows SPA to be negatively affected. Mitigation measures will be implemented to ensure that the receiving surface water network is protected and the conservation objectives of the Dovegrove Callows SPA are not negatively affected by the Proposed Project.

1408. The Proposed Project has the potential to spread and introduce INNS to Dovegrove Callows SPA via the Little Brosna River catchment, which drains to Dovegrove Callows SPA. Mitigation measures will be implemented to ensure that any INNS present within the Construction Working Width or the 20m wide Permanent Wayleave are controlled and are not spread to Dovegrove Callows SPA, and that the conservation objectives of Dovegrove Callows SPA are not negatively affected by the Proposed Project.

1409. There are therefore, no residual direct or indirect impacts associated with the Proposed Project that could adversely affect the integrity of Dovegrove Callows SPA.

7.13.5 Conclusion of Assessment for Dovegrove Callows SPA 4137

1410. None of the potential direct or indirect impacts associated with the Proposed Project would affect the conservation objectives of the special conservation interest Greenland white-fronted goose population of Dovegrove Callows SPA. Mitigation measures are included to ensure that water quality in the receiving surface water environment is protected and that INNS are not spread or introduced to Dovegrove Callows SPA.

1411. The examination, analysis and evaluation covered all relevant information in respect of the special conservation interest species of the SPA. This included the potential impacts, mitigation and prevention measures and whether or not the predicted impacts would affect the conservation objectives that support the conservation condition for the special conservation interest species concerned (either directly or indirectly; refer to Section 8 for the in-combination assessment). It has been concluded beyond reasonable scientific doubt that, subject to the implementation of mitigation measures, the Proposed Project would not adversely affect the integrity of the Dovegrove Callows SPA.

7.14 River Little Brosna Callows SPA 4086

7.14.1 Special Conservation Interest Species and Conservation Objectives of River Little Brosna Callows SPA 4086

1412. The special conservation interest species of the River Little Brosna Callows SPA, and the overall conservation objective for each, are listed in Table 7.42.

Table 7.42: Special Conservation Interest Species and Conservation Objectives of River Little Brosna Callows SPA (NPWS 2025e)

Special Conservation Interests	Conservation Objectives
Whooper swan (*Cygnus cygnus*) [A038] (Wintering)	To maintain or restore favourable conservation condition of the bird species To maintain or restore the favourable conservation condition of the wetland habitat
Wigeon (*Anas penelope*) [A050] (Wintering)	
Teal (*Anas crecca*) [A052] (Wintering)	
Pintail (*Anas acuta*) [A054] (Wintering)	
Shoveler (*Anas clypeata*) [A056] (Wintering)	
Golden plover (*Pluvialis apricaria*) [A140] (Wintering)	
Lapwing (*Vanellus vanellus*) [A142] (Wintering)	
Black-tailed godwit (*Limosa limosa*) [A156] (Wintering)	
Black-headed gull (*Chroicocephalus ridibundus*) [A179] (Wintering)	
Greenland white-fronted goose (*Anser albifrons flavirostris*) [A395] (Wintering)	
Wetlands [A999]	

1413. In conjunction with considering the generic conservation objective, to maintain or restore the favourable conservation condition of the Annex I species for which the SPA has been selected, the available site-specific conservation objectives document for the River Little Brosna Callows SPA (NPWS 2025e) also informed this assessment. This document sets out the attributes, measures and targets that define the favourable conservation condition of the special conservation interest species within the European site.

7.14.2 Ecological Baseline Description for River Little Brosna Callows SPA 4086

1414. The River Little Brosna Callows SPA follows the River Brosna from its confluence with the River Shannon for approximately 9km south-eastwards to just beyond New Bridge on the R438 road. The site extends along both sides of the river within Counties Offaly and Tipperary. The main habitat present is the extensive area of low-lying callow grassland along the floodplain of the river. These grasslands are subject to prolonged flooding in winter, early spring and occasionally in summer. The site is a SPA under the Birds Directive, of special conservation interest for the following species: whooper swan, Greenland white-fronted goose, wigeon, teal, pintail, shoveler, golden plover, lapwing, black-tailed godwit and black-headed gull. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for wetland & waterbirds (DAHG 2014d).

1415. The River Little Brosna Callows is an internationally important site for wintering waterfowl, being notable both for numbers and diversity of species. Of particular note is the internationally important Greenland white-fronted goose flock (527) that is based along the Brosna, mean peak count for the five winters 1994/95 to 1998/99. The populations of golden plover (10,577 – three year mean peak from aerial surveys between 1995/96 and 1999/2000) and black-tailed godwit (2,900 – four year mean peak between 1995/96 and 1999/2000) are also of international importance. The River Little Brosna Callows is an

important spring passage site and the black-tailed godwit flock, which is the largest in the country, exceeds over 4,000 birds on some occasions. A further seven species have populations of national importance, i.e. whooper swan (122), wigeon (8,116), teal (2,683), pintail (130), shoveler (164), lapwing (6,552) and black-headed gull (1,939) – all figures are four year mean peaks between 1995/96 and 1999/2000 except lapwing (three year mean peak from aerial surveys between 1995/96 and 1999/2000) and black-headed gull (two year mean peak for 1999/2000 and 2000/01). The populations of wigeon, teal and golden plover are consistently among the largest in the country. Other species which occur include mute swan (79), mallard (334), pochard (38), dunlin (*Calidris alpina*) (434) and curlew (194); the population of dunlin is of particular note as it comprises the largest inland population in the country (DAHG 2014d).

1416. The callows are also of importance for breeding waders, and such species as redshank (65 pairs in 1987 and 22 pairs in 2002), snipe (35 pairs in 1987 and 23 pairs in 2002) and lapwing (41 pairs in 1987) have been recorded breeding here. Corncrake formerly bred on the Brosna callows (two calling birds recorded in 1993) and may still breed occasionally (DAHG 2014d).

1417. The River Little Brosna Callows SPA is one of the top sites in the country for wintering waterfowl and part of the site is a wildfowl sanctuary. It is of international importance on account of the total numbers of birds that use it, as well as for its Greenland white-fronted goose, golden plover and black-tailed godwit populations. In addition, there are a further seven species with nationally important populations, several of which are the largest in the country. Also of note is that three of the species which occur regularly, i.e. whooper swan, Greenland white-fronted goose and golden plover, are listed on Annex I of the Birds Directive (DAHG 2014d).

1418. The Proposed Project boundary is located 10km south-east of River Little Brosna Callows SPA site boundary and does not overlap with this European site. The hydrogeological ZoI of the Proposed Project does not extend to 10km and poses no risk of hydrogeological effects within River Little Brosna Callows SPA. However, the Proposed Project does cross a number of watercourses that drain to River Little Brosna Callows SPA more than 7km away (firstly via the Dovegrove Callows SPA), including: the Little Brosna River (WCX026), the Rock [Birr] River (WCX027), the Breaghmore River (WCX031) and the Camcor River (WCX032) (refer to Appendix J: Watercourse Crossings and Pathways to European Sites, for more details and EIAR Figure 8.4 to Figure 8.108 for the locations of the watercourse crossings).

7.14.3 Examination and Analysis of Potential Direct and Indirect Impacts

1419. As the Proposed Project does not overlap with River Little Brosna Callows SPA, the habitat supporting the special conservation interests within the SPA would not be directly impacted. River Little Brosna Callows SPA (and potential ex-situ sites) also lies beyond the ZoI of any hydrogeological or air quality impacts. At a distance of 10km, the Proposed Project would not disturb or displace wintering birds at River Little Brosna Callows SPA. The Operational Phase of the Proposed Project poses no risk of disturbing or displacing wintering birds from the SPA, as none of the habitats within the ZoI of operational activities are important habitats for the wintering birds designated for this SPA.

1420. However, in the absence of mitigation measures, the Proposed Project's impacts described in the following sections could potentially affect the conservation objective attributes and targets supporting the conservation condition of the special conservation interest bird populations of the River Little Brosna Callows SPA.

7.14.3.1 Construction Phase

7.14.3.1.1 Habitat degradation as a Result of Excavation and Tunnelling

1421. The only influence tunnelling or excavation works associated with the Proposed Project could have on River Little Brosna Callows SPA is indirectly during the pipeline installation works at the watercourse crossings, where there is a risk of water quality impacts in the receiving watercourses regardless of whether open cut or trenchless techniques are used. This is discussed further below in the hydrological impacts section.

7.14.3.1.2 Habitat degradation as a Result of Hydrological Impacts/Water Quality Impacts

1422. As the Proposed Project crosses watercourses that drain to River Little Brosna Callows SPA, construction works at these watercourse crossings pose a risk of affecting water quality in the European site through an accidental spillage of cement-based products or accidental spillage of hydrocarbons.

1423. Affecting water quality in receiving watercourses and in River Little Brosna Callows SPA has the potential to affect the conservation objectives supporting the conservation condition of the special conservation interest bird populations of River Little Brosna Callows SPA.

7.14.3.1.3 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1424. As the Proposed Project would involve instream construction works on watercourses that drain to River Little Brosna Callows SPA, there is the potential that INNS could be introduced to the surface water network and establish populations downstream in the European site.

1425. Introducing INNS to River Little Brosna Callows SPA has the potential to affect the quality of the wetland habitat that supports the conservation condition of the special conservation interest bird populations of Dovegrove Callows SPA.

7.14.3.1.4 Habitat Loss and Disturbance Impacts Outside of the SPA boundary

1426. As the Proposed Project is only 10km from River Little Brosna Callows SPA, it could potentially provide supporting habitat to special conservation interest species for which this site is designated. Lapwing and golden plover regularly range to a distance of 15km between foraging locations (Gillings *et al.* 2005). Similarly, black-headed gulls have a maximum foraging distance of 18.5km during the breeding season (Gorke and Brandl 1986). Conversely dabbling ducks typically forage at lesser distances of 1-2km from roosts (Legagneux *et al.* 2009). It is therefore considered that connectivity could exist between the Proposed Project and this SPA for several special conservation interest species for which the site was designated. The construction of the Proposed Project could result in a reduction of supporting habitat for this species and construction activities may result in effective habitat loss through disturbance and displacement effects.

1427. Considering a buffer of up to 20km to encompass lands potentially used by some of the special conservation interest species outside of River Little Brosna Callows SPA, this covers an area of more than 1,500km^2. Of that area, the Proposed Project would directly impact c.9km^2 of habitat, the majority of which (c.6km^2 or approximately 66%) is improved agricultural grassland with a further c.1km^2 classified as cutover bog. However, all habitat loss and potential disturbance impacts within 20km of the Proposed Project would be temporary (up to 18 months) with all of the habitat affected by the pipeline installation works to be reinstated post-construction, and reinstated habitat would likely continue to be managed by the landowners in line with its current agricultural use.

1428. Given the temporary nature of the construction works and habitat impacts, and the relatively small area of habitat that would be temporarily affected during the Construction Phase in comparison to the total area surrounding the SPA that remains available to the wintering bird populations, there would not be any significant long-term effects on the wintering bird populations of the River Little Brosna Callows SPA due to either habitat loss impacts or disturbance effects during the Construction Phase.

7.14.3.2 Operational Phase

7.14.3.2.1 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1429. Although there would not be any routine discharges to the surface water network during the Operational Phase, Washout Valves would be located along the pipeline to facilitate planned repair and maintenance works (every 20-25 years). The water will be dechlorinated before discharge using dechlorination chemicals and there is therefore a risk to water quality in receiving watercourses from accidental chemical spills from the Siltbuster mobile treatment unit (Section 7.1.4.3). Repair and maintenance works may require excavations to repair or replace sections of pipeline which pose a risk of affecting water quality in the surface water network.

1430. Affecting water quality in receiving watercourses and in River Little Brosna Callows SPA has the potential to affect the conservation objectives supporting the conservation condition of the special conservation interest bird populations of Dovegrove Callows SPA.

7.14.3.2.2 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1431. During the Operational Phase, repair and maintenance works may be required to sections of the pipeline within the Proposed Project, which cross watercourses that drain to River Little Brosna Callows SPA. There is a risk that plant INNS may colonise lands within the 20m wide Permanent Wayleave post-construction and therefore, a risk that repair and maintenance works could potentially introduce INNS to the surface water network and establish populations downstream in the European site.

1432. Introducing INNS to Dovegrove Callows SPA has the potential to affect the quality of the wetland habitat that supports the conservation condition of the special conservation interest bird populations of River Little Brosna Callows SPA.

7.14.3.3 Summary

1433. Table 7.43 presents a summary of the potential impacts on the special conservation interest species of the River Little Brosna Callows SPA as a result of the Proposed Project and how these impacts affect the site's conservation objectives. Those highlighted in blue are the special conservation interest species which are present within the ZoI of the Proposed Project that could potentially be impacted.

Table 7.43: Special Conservation Interest Species of the River Little Brosna Callows SPA and Summary of Potential Impacts

Special Conservation Interests	Potential Impacts	
	Construction Phase	Operational Phase
Whooper swan (*Cygnus cygnus*) [A038] (Wintering)	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
Wigeon (*Anas penelope*) [A050] (Wintering)		
Teal (*Anas crecca*) [A052] (Wintering)		
Pintail (*Anas acuta*) [A054] (Wintering)		
Shoveler (*Anas clypeata*) [A056] (Wintering)		
Golden plover (*Pluvialis apric*aria) [A140] (Wintering)		
Lapwing (*Vanellus vanellus*) [A142] (Wintering)		
Black-tailed godwit (*Limosa limosa*) [A156] (Wintering)		
Black-headed gull (*Chroicocephalus ridibundus*) [A179] (Wintering)		
Greenland white-fronted goose (*Anser albifrons flavirostris*) [A395] (Wintering)		
Wetland and waterbirds [A999]		

1434. The specific attributes and targets used to define the conservation objectives of the special conservation interest species of the River Little Brosna Callows SPA are presented in Table 7.44, along with the potential impacts associated with the Proposed Project. Those special conservation interests, and the supporting attributes, measures, and targets at risk of being affected by the Proposed Project are highlighted in blue.

Table 7.44: Potential Impacts on the Conservation Objectives of the River Little Brosna Callows SPA

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Whooper swan (*Cygnus cygnus*) [A038] (Wintering), wigeon (*Anas penelope*) [A050] (Wintering), teal (*Anas crecca*) [A052] (Wintering), pintail (*Anas acuta*) [A054] (Wintering) shoveler (*Anas clypeata*) [A056] (Wintering), golden plover (*Pluvialis apricaria*) [A140] (Wintering), lapwing (*Vanellus vanellus*) [A142] (Wintering), black-tailed godwit (*Limosa limosa*) [A156] (Wintering), black-headed gull (*Chroicocephalus ridibundus*) [A179] (Wintering), Greenland white-fronted goose (*Anser albifrons flavirostris*) [A395] (Wintering) **To maintain or restore the favourable conservation condition of the species in the River Little Brosna Callows SPA, which is defined by the following list of attributes and targets:**				
Winter population trend (percentage change in number of individuals)	Long-term winter population trend is stable or increasing.	Yes The River Little Brosna Callows SPA boundary lies more than 7km from where the Proposed Project crosses watercourses that drain to this SPA. An accidental pollution event during the Construction Phase, of a sufficient magnitude, could potentially have significant adverse effects on wetland habitats in the SPA. Although unlikely, given the SPA site boundary is more than 7km from the Proposed Project, there remains a risk that INNS capable of colonising wetland habitats could be spread, via the surface water network, to the River Little Brosna Callows SPA. These impacts could potentially affect the quality of the wetland habitat that supports these special conservation interest species in the River Little Brosna Callows SPA, which in turn could affect the number and range of areas used by the wintering birds and affect population numbers.	Yes Measures to prevent the spread of INNS would be implemented to ensure they are not introduced to River Little Brosna SPA (Section 7.14.4). Measures to maintain water quality in receiving watercourses during the Construction Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on habitats in River Little Brosna SPA are avoided (Section 7.14.4).	No potential for effects, following the implementation of mitigation measures.
Winter spatial distribution (hectares, time and intensity of use)	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target.			
Forage spatial distribution, extent and abundance (Location, hectares, and forage biomass)	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target.			
Supporting habitat: area and quality (hectares and quality)	Sufficient area of utilisable habitat available in ecologically important sites outside the SPA.			
Disturbance at wintering site (intensity, frequency, timing and duration)	Disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution.	No At a distance of 7km from the Proposed Project boundary there is no potential for disturbance effects on the special conservation interest species within the SPA. The Proposed Project would not cause a barrier to connectivity. The majority of elements to the Proposed Project would be located underground or of such a low profile, relative to the surrounding area not to cause	No	No potential for effects.
Barriers to connectivity and site use (number, location, shape and hectares)	Barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Roost spatial distribution and extent (location and hectares of roosting habitat)	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target.	obstruction to commuting Greenland white-fronted goose from the SPA. There are no risks to overnight roosting sites used by the special conservation interest species within the SPA. No suitable wetlands or permanent water bodies such as lakes or estuaries suitable for roosting are located within or immediately adjacent to the Proposed Project and within commuting distance to the SPA.	Cont. - as above	Cont. - as above
Wetlands A999 **To maintain the Favourable conservation condition of Wetland habitats in the River Little Brosna Callows SPA as a resource for the regularly occurring migratory waterbirds that utilise these areas. This is defined by the following list of attributes and targets:**				
Wetland habitat area (hectares)	No significant loss to wetland habitat within the SPA, other than that occurring from natural patterns of variation.	Yes The River Little Brosna Callows SPA boundary lies more than 7km from where the Proposed Project crosses watercourses that drain to this SPA. An accidental pollution event during the Construction Phase, of a sufficient magnitude, could potentially have significant adverse effects on aquatic habitats in the SPA. A reduction in water quality in the River Little Brosna Callows SPA could negatively impact the regularly occurring migratory waterbirds that utilise this wetland habitat.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on habitats in the River Little Brosna Callows SPA are avoided (Section 7.14.4).	No potential for effects, following the implementation of mitigation measures.
Wetland habitat quality and functioning (quality and function of the wetland habitat)	No significant impact on the quality or functioning of the wetland habitat within the SPA, other than that occurring from natural patterns of variation.			

7.14.4 Design Requirements and Mitigation Measures

1435. The positioning of the infrastructure associated with the Proposed Project has been designed to avoid European sites, where possible, and to minimise the risks of indirect effects as far as is possible. The design measures are described in Section 3.5.

7.14.4.1 Construction Phase Mitigation

1436. The mitigation measures to protect water quality in the receiving environment during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example: the use of sandbags, silt curtains or similar barriers, buffers of natural uncleared vegetation, and suspension of works within and adjacent to watercourses during periods of heavy rainfall. Such mitigation measures are considered best practice and are in accordance with IFI (2016) guidelines.

1437. The mitigation measures to ensure that INNS are not spread or introduced to River Little Brosna Callows SPA during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example: the thorough cleaning of plant and equipment using a power washer unit prior to leaving site, in accordance with the OPW Environmental Standard Operating Procedures (OPW 2011) and/or IFI Biosecurity Protocols (IFI 2010).

7.14.4.2 Operational Phase Mitigation

1438. The mitigation measures to protect water quality in the receiving environment during the Operational Phase are similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

1439. The mitigation measures to ensure that INNS are not spread or introduced to River Little Brosna Callows SPA during the Operational Phase are also similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

7.14.5 Residual Impacts

1440. The Proposed Project has the potential to negatively affect water quality in the receiving surface water environment during the Construction Phase and the Operational Phase and, as watercourses crossed by the Proposed Project drain to the Little Brosna River, there is the potential for the conservation objectives of River Little Brosna Callows SPA to be negatively affected. Mitigation measures will be implemented to ensure that the receiving surface water network is protected and the conservation objectives of the River Little Brosna Callows SPA are not negatively affected by the Proposed Project.

1441. The Proposed Project has the potential to spread and introduce INNS to River Little Brosna Callows SPA via the Little Brosna River catchment, which drains to River Little Brosna Callows SPA. Mitigation measures will be implemented to ensure that any INNS present within the Construction Working Width or the 20m wide Permanent Wayleave are controlled and are not spread to River Little Brosna Callows SPA, and that the conservation objectives of River Little Brosna Callows SPA are not negatively affected by the Proposed Project.

1442. There are therefore, no residual direct or indirect impacts associated with the Proposed Project that could adversely affect the integrity of River Little Brosna Callows SPA.

7.14.6 Conclusion of Assessment for River Little Brosna Callows SPA 4086

1443. None of the potential direct or indirect impacts associated with the Proposed Project would affect the conservation objectives of the special conservation interests of River Little Brosna Callows SPA. Mitigation measures are included to ensure that water quality in the receiving surface water environment is protected and that INNS are not spread or introduced to River Little Brosna Callows SPA.

1444. The examination, analysis and evaluation covered all relevant information in respect of the special conservation interest species of the SPA. This included the potential impacts, mitigation and prevention measures and whether or not the predicted impacts would affect the conservation objectives that support the conservation condition for the special conservation interest species concerned (either directly or indirectly; refer to Section 8 for the in-combination assessment). It has been concluded beyond reasonable scientific doubt that, subject to the implementation of mitigation measures, the Proposed Project would not adversely affect the integrity of the River Little Brosna Callows SPA.

7.15 River Shannon and River Fergus Estuaries SPA 4077

7.15.1 Special Conservation Interest Species and Conservation Objectives of River Shannon and River Fergus Estuaries SPA 4077

1445. The special conservation interest species of the River Shannon and River Fergus Estuaries SPA, and the overall conservation objective for each, are listed in Table 7.45.

Table 7.45: Special Conservation Interests and Conservation Objectives of River Shannon and River Fergus SPA (NPWS 2012b)

Special Conservation Interests	Conservation Objectives
Cormorant (*Phalacrocrax carbo*) [A017] (Wintering and Breeding)	To maintain favourable conservation condition of the bird species
Whooper Swan (*Cygnus cygnus*) [A038] (Wintering)	
Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] (Wintering)	
Shelduck (*Tadorna tadorna*) [A048] (Wintering)	
Wigeon (*Anas penelope*) [A050] (Wintering)	
Teal (*Anas crecca*) [A052] (Wintering)	
Pintail (*Anas acuta*) [A054] (Wintering)	
Shoveler (*Anas clypeata*) [A056] (Wintering)	
Scaup (*Aythya marila*) [A062] (Wintering)	
Ringed Plover (*Charadrius hiaticula*) [A137] (Wintering)	
Golden Plover (*Pluvialis apricaria*) [A140] (Wintering)	
Grey Plover (*Pluvialis squatarola*) [A141] (Wintering)	
Lapwing (*Vanellus vanellus*) [A142] (Wintering)	
Knot (*Calidris canutus*) [A143] (Wintering)	
Dunlin (*Calidris alpina*) [A149] (Wintering)	
Black-tailed Godwit (*Limosa limosa*) [A156] (Wintering)	
Bar-tailed Godwit (*Limosa lapponica*) [A157] (Wintering)	
Curlew (*Numenius arquata*) [A160] (Wintering)	
Redshank (*Tringa totanus*) [A162] (Wintering)	
Greenshank (*Tringa nebularia*) [A164] (Wintering)	
Black-headed Gull (*Chroicocephalus ridibundus*) [A179] (Wintering)	

Special Conservation Interests	Conservation Objectives
Wetland and Waterbirds [A999]	To maintain the favourable conservation condition of the wetland habitat

1446. In conjunction with considering the generic conservation objective to maintain or restore the favourable conservation condition of the Annex I species for which the SPA has been selected, the available site-specific conservation objectives document for the River Shannon and River Fergus Estuaries SPA (NPWS 2012b) also informed this assessment. This document sets out the attributes, measures and targets that define the favourable conservation condition of the special conservation interest species within the European site.

7.15.2 Ecological Baseline Description for River Shannon and River Fergus Estuaries SPA 4077

1447. The estuaries of the River Shannon and River Fergus from the largest estuarine complex in Ireland. The site comprises the entire estuarine habitat from Limerick City westwards as far as Doonaha in Co. Clare and Dooneen Point in Co. Kerry.

1448. The site has vast expanses of intertidal flats which contain a diverse macro-invertebrate community, e.g. *Macoma-Scrobicularia-Nereis*, which provides a rich food resource for the wintering birds. Salt marsh vegetation frequently fringes the mudflats and this provides important high tide roost areas for the wintering birds. Elsewhere in the site the shoreline comprises stony or shingle beaches.

1449. The site is a SPA under the Birds Directive, of special conservation interest for the following species: Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Pintail, Shoveler, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank and Black-headed Gull. It is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

1450. The site is the most important coastal wetland site in the country and regularly supports in excess of 50,000 wintering wildfowl (57,133 – five year mean for the period 1995/96 to 1999/2000), a concentration easily of international importance. The site has internationally important populations of Light-bellied Brent Goose (494), Dunlin (15,131), Black-tailed Godwit (2,035) and Redshank (2,645). A further 17 species have populations of national importance, i.e. Cormorant (245), Whooper Swan (118), Shelduck (1,025), Wigeon (3,761), Teal (2,260), Pintail (62), Shoveler (107), Scaup (102), Ringed Plover (223), Golden Plover (5,664), Grey Plover (558), Lapwing (15,126), Knot (2,015), Bar-tailed Godwit (460), Curlew (2,396), Greenshank (61) and Black-headed Gull (2,681) – figures are five year mean peak counts for the period 1995/96 to 1999/2000. The site is among the most important in the country for several of these species, notably Dunlin (13% of the national total), Lapwing (6% of the national total) and Redshank (9% of national total).

1451. The site also supports a nationally important breeding population of Cormorant (93 pairs in 2010). Other species that occur include Mute Swan (103), Mallard (441), Red-breasted Merganser (20), Great Crested Grebe (50), Grey Heron (38), Oystercatcher (551), Turnstone (124) and Common Gull (445) – figures are fiver year mean peak counts for the period 1995/96 to 1999/2000.

1452. The River Shannon and River Fergus Estuaries SPA is an internationally important site that supports and assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of four species, i.e. Light-bellied Brent Goose, Dunlin, Black-tailed Godwit and Redshank. In addition, there are 17 species that have wintering populations of national importance. The site also supports a nationally important breeding population of Cormorant. Of particular note is that three of the species which occur

regularly are listed as Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover and Bar-tailed Godwit. Parts of the River Shannon and River Fergus Estuaries SPA are Wildfowl Sanctuaries.

7.15.3 Examination and Analysis of Potential Direct and Indirect Impacts

1453. As the Proposed Project does not overlap with River Shannon and River Fergus Estuaries SPA, the habitat supporting the special conservation interests within the SPA would not be directly impacted. River Shannon and River Fergus Estuaries SPA (and potential ex-situ sites) also lies beyond the ZoI of any hydrogeological or air quality impacts. At a distance of 6km, the Proposed Project would not disturb or displace wintering birds within the River Shannon and River Fergus Estuaries SPA. The Operational Phase of the Proposed Project poses no risk of disturbing or displacing wintering birds from the SPA, as none of the habitats within the ZoI of operational activities are important habitats for the wintering birds designated for this SPA.

1454. However, in the absence of mitigation measures, the Proposed Project's impacts described in the following sections could potentially affect the conservation objective attributes and targets supporting the conservation condition of the special conservation interest bird populations of the River Shannon and River Fergus Estuaries SPA.

7.15.3.1 Construction Phase

7.15.3.1.1 Habitat Degradation as a Result of Excavation and Tunnelling

1455. The only influence tunnelling or excavation works associated with the Proposed Project could have on the River Shannon and River Fergus Estuaries SPA is indirectly during the pipeline installation works at the watercourse crossings, where there is a risk of water quality impacts in the receiving watercourses regardless of whether open cut or trenchless techniques are used. This is discussed further below in the hydrological impacts section.

7.15.3.1.2 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1456. As the Proposed Project crosses watercourses that drain to the River Shannon and River Fergus Estuaries SPA, construction works at these watercourse crossings pose a risk of affecting water quality in the European site through an accidental spillage of cement-based products or accidental spillage of hydrocarbons.

1457. Affecting water quality in receiving watercourses of the River Shannon and River Fergus Estuaries SPA has the potential to affect the conservation objectives supporting the conservation condition of the special conservation interest bird populations of the River Shannon and River Fergus Estuaries SPA.

7.15.3.1.3 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1458. As the Proposed Project would involve instream construction works on watercourses that drain to the River Shannon and River Fergus Estuaries SPA, there is the potential that INNS could be introduced to the surface water network and establish populations downstream in the European site.

1459. Introducing INNS to the River Shannon and River Fergus Estuaries SPA has the potential to affect the quality of the wetland habitat that supports the conservation condition of the special conservation interest bird populations of the River Shannon and River Fergus Estuaries SPA.

7.15.3.1.4 Habitat Loss and Disturbance Impacts Outside of the SPA Boundary

1460. One of the special conservation interest species of River Shannon and River Fergus Estuaries SPA, cormorant, was regularly recorded using Parteen Basin and the associated fringing aquatic habitats, as

well as being regularly recorded commuting along the River Shannon over the proposed 38kV Uprate Works. There is no information or evidence to confirm whether cormorant recorded in Parteen Basin or over the 38kV uprate works are birds from the special conservation interest populations of the River Shannon and River Fergus Estuaries SPA. However, given the close proximity of Parteen Basin and the 38kV works to the River Shannon and River Fergus Estuaries SPA (approximately 15km and 12km respectively), and considering the River Shannon may serve as a commuting corridor between Lough Derg and the lower stretches of the River Shannon, a precautionary approach has been adopted.

1461. No cormorant were recorded using habitat within the footprint of the proposed construction works. The majority of observations were of birds using the western (more natural) side of Parteen Basin rather than the eastern (man-made) embankment, where the RWI&PS is located. Cormorants were also observed flying at height (typically 30 metres or more above ground) over the existing 38kV powerlines.

1462. Cormorant typically nest in colonies on the coast but some nest inland in trees. The aquatic and terrestrial habitat at the RWI&PS site (as described in Section 7.1.2.1) and the 38kV uprate work areas do not provide adequate cover and is not considered to be suitable breeding habitat for any of the special conservation interest species. It is likely that these areas are used occasionally by SCI species, including cormorant, for foraging or commuting purposes only.

1463. The total area of Parteen Basin is 360ha, and the construction of the RWI&PS would result in the loss of c.0.6ha of lake habitat. This represents a loss of 0.15% of the area of Parteen Basin. To put this into context of the area of habitat within Lough Derg (Shannon) SPA that supports the special conservation interest populations, it represents c.0.004%. The loss of a habitat area this small, outside of the boundary of the River Shannon and River Fergus Estuaries SPA, would not have any effect on habitat availability or prey abundance that would affect population numbers.

1464. Disturbance during the Construction Phase has the potential to disturb and displace birds using Parteen Basin for a distance of up to 150m from the works area (see Section 5.1.3.4 for rationale supporting the quoted 150m disturbance distance). However, any potential disturbance impacts would be temporary and short term (up to 18 months) and would not have any adverse effects on bird usage of Parteen Basin. The Operational Phase of the Proposed Project would not result in any disturbance or displacement effects on wintering or breeding birds using Parteen Basin.

1465. Given the temporary nature of the construction works, and the relatively small area of habitat that would be lost and temporarily affected during the Construction Phase by disturbance compared to the total area available to the bird populations within the SPA, there would not be any adverse effects on the breeding or wintering bird populations of the River Shannon and River Fergus Estuaries SPA due to either habitat loss impacts or disturbance effects during the Construction Phase.

7.15.3.2 Operational Phase

7.15.3.2.1 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1466. Although there would not be any routine discharges to the surface water network during the Operational Phase, Washout Valves would be located along the pipeline to facilitate planned repair and maintenance works (every 20-25 years). The water will be dechlorinated before discharge using dechlorination chemicals and there is therefore a risk to water quality in receiving watercourses from accidental chemical spills from the Siltbuster mobile treatment unit (Section 7.1.4.3). Repair and maintenance works may require excavations to repair or replace sections of pipeline which pose a risk of affecting water quality in the surface water network.

1467. Affecting water quality in receiving watercourses and in the River Shannon and River Fergus Estuaries SPA has the potential to affect the conservation objectives supporting the conservation condition of the special conservation interest bird populations of the River Shannon and River Fergus Estuaries SPA.

7.15.3.2.2 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1468. During the Operational Phase, repair and maintenance works may be required to sections of the pipeline within the Proposed Project, which cross watercourses that drain to the River Shannon and River Fergus Estuaries SPA. There is a risk that plant INNS may colonise lands within the 20m wide Permanent Wayleave post-construction and therefore, a risk that repair and maintenance works could potentially introduce INNS to the surface water network and establish populations downstream in the European site.

1469. Introducing INNS to the River Shannon and River Fergus Estuaries SPA has the potential to affect the quality of the wetland habitat that supports the conservation condition of the special conservation interest bird populations of the River Shannon and River Fergus Estuaries SPA.

7.15.3.2.3 Summary

1470. Table 7.46 presents a summary of the potential impacts on the special conservation interest species of the River Shannon and River Fergus Estuaries SPA as a result of the Proposed Project and how these impacts affect the site's conservation objectives. Those highlighted in blue are the special conservation interest species which are present within the ZoI of the Proposed Project that could potentially be impacted.

Table 7.46: Special Conservation Interest Species of the River Shannon and River Fergus Estuaries SPA and Summary of Potential Impacts

Special Conservation Interests	Potential Impacts	
	Construction Phase	Operational Phase
Cormorant (*Phalacrocrax carbo*) [A017] (Wintering and Breeding)	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
Whooper Swan (*Cygnus cygnus*) [A038] (Wintering)		
Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] (Wintering)		
Shelduck (*Tadorna tadorna*) [A048] (Wintering)		
Wigeon (*Anas penelope*) [A050] (Wintering)		
Teal (*Anas crecca*) [A052] (Wintering)		
Pintail (*Anas acuta*) [A054] (Wintering)		
Shoveler (*Anas clypeata*) [A056] (Wintering)		
Scaup (*Aythya marila*) [A062] (Wintering)		
Ringed Plover (*Charadrius hiaticula*) [A137] (Wintering)		
Golden Plover (*Pluvialis apricaria*) [A140] (Wintering)		
Grey Plover (*Pluvialis squatarola*) [A141] (Wintering)		
Lapwing (*Vanellus vanellus*) [A142] (Wintering)		
Knot (*Calidris canutus*) [A143] (Wintering)		
Dunlin (*Calidris alpina*) [A149] (Wintering)		
Black-tailed Godwit (*Limosa limosa*) [A156] (Wintering)		
Bar-tailed Godwit (*Limosa lapponica*) [A157] (Wintering)		
Curlew (*Numenius arquata*) [A160] (Wintering)		
Redshank (*Tringa totanus*) [A162] (Wintering)		
Greenshank (*Tringa nebularia*) [A164] (Wintering)		
Black-headed Gull (*Chroicocephalus ridibundus*) [A179] (Wintering)		
Wetland and Waterbirds [A999]		

1471. The specific attributes and targets used to define the conservation objectives of the special conservation interest species of the River Shannon and River Fergus Estuaries SPA are presented in Table 7.47, along with the potential impacts associated with the Proposed Project. Those special conservation interests, and the supporting attributes, measures, and targets at risk of being affected by the Proposed Project are highlighted in blue.

Table 7.47: Potential Impacts on the Conservation Objectives of the River Shannon and River Fergus Estuaries SPA

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Cormorant (*Phalacrocorax carbo*) [A017] To maintain or restore the favourable conservation condition of the species in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:				
Breeding population abundance: apparently occupied nests (AONs) (Number)	No significant decline	Yes The River Shannon and River Fergus Estuaries SPA boundary lies more than 6km from where the Proposed Project crosses watercourses that drain to this SPA. An accidental pollution event during the Construction Phase, of a sufficient magnitude, could potentially have significant adverse effects on wetland habitats in the SPA. Although unlikely, given the SPA site boundary is more than 6km from the Proposed Project, there remains a risk that INNS capable of colonising wetland habitats could be spread, via the surface water network, to the River Shannon and River Fergus Estuaries SPA. These impacts could potentially affect the quality of the wetland habitat that supports these special conservation interest species in the River Shannon and River Fergus Estuaries SPA, which in turn could affect the number and range of areas used by breeding cormorant and affect population numbers.	Yes Measures to prevent the spread of INNS would be implemented to ensure they are not introduced to River Shannon and River Fergus Estuaries SPA (Section 7.15.4). Measures to maintain water quality in receiving watercourses during the Construction Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on habitats in River Shannon and River Fergus Estuaries SPA are avoided (Section 7.15.4).	No potential for effects, following the implementation of mitigation measures.
Productivity rate (Mean number)	No significant decline			
Distribution: breeding colonies (Number; location; area [hectares])	No significant decline			
Prey biomass available (Kilogrammes)	No significant decline			
Barriers to connectivity (Number; location; shape; area [hectares])	No significant increase	No There is no spatial overlap with the SPA, there is no potential to affect the extent or quality of suitable Cormorant nesting habitat within the SPA. Similarly, there is no potential to create a barrier to connectivity or cause disturbance effects on cormorant within the SPA.	No	No potential for effects.
Disturbance at the breeding site (Level of impact)	Human activities should occur at levels that do not adversely affect the breeding cormorant population			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Cormorant (*Phalacrocorax carbo*) [A017], Whooper Swan (*Cygnus cygnus*) [A038], Light-bellied Brent Goose (*Branta bernicla hrota*) [A046], Shelduck (*Tadorna tadorna*) [A048], Wigeon (*Anas penelope*) [A050], Teal (*Anas crecca*) [A052], Pintail (*Anas acuta*) [A054], Shoveler (*Anas clypeata*) [A056], Scaup (*Aythya marila*) [A062],Ringed Plover (*Charadrius hiaticula*) [A137],Golden Plover (*Pluvialis apricaria*) [A140],Grey Plover (*Pluvialis squatarola*) [A141], Lapwing (*Vanellus vanellus*) [A142], Knot (*Calidris canutus*) [A143],Dunlin (*Calidris alpina*) [A149],Black-tailed Godwit (*Limosa limosa*) [A156], Bar-tailed Godwit (*Limosa lapponica*) [A157],Curlew (*Numenius arquata*) [A160], Redshank (*Tringa totanus*) [A162], Greenshank (*Tringa nebularia*) [A164], Black-headed Gull (*Chroicocephalus ridibundus*) [A179] **To maintain or restore the favourable conservation condition of the species in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:**				
Population trend (Percentage change)	Long term population trend stable or increasing	Yes The River Shannon and River Fergus Estuaries SPA boundary lies more than 6km from where the Proposed Project crosses watercourses that drain to this SPA. An accidental pollution event during the Construction Phase, of a sufficient magnitude, could potentially have adverse effects on wetland habitats in the SPA. Although unlikely, given the SPA is more than 6km from the Proposed Project, there remains a risk that INNS capable of colonising wetland habitats could be spread, via the surface water network, to the River Shannon and River Fergus Estuaries SPA. These impacts could potentially affect the quality of the wetland habitat that supports these special conservation interest species in the River Shannon and River Fergus Estuaries SPA, which in turn could affect the number and range of areas used by the Wildfowl and population numbers.	Yes Measures to prevent the spread of INNS would be implemented to ensure they are not introduced to the River Shannon and River Fergus Estuaries SPA (Section 7.15.4). Measures to maintain water quality in receiving watercourses during the Construction Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on habitats in the River Shannon and River Fergus Estuaries SPA are avoided (Section 7.15.4).	No potential for effects, following the implementation of mitigation measures.
Distribution (Range, timing and intensity of use of areas)	There should be no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation			
Wetlands [A999] **To maintain the favourable conservation condition of wetlands in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:**				
Wetland habitat area (hectares)	No significant loss to wetland habitat within the SPA, other than that occurring from natural patterns of variation.	Yes The River Shannon and River Fergus Estuaries SPA boundary lies more than 6km from where the Proposed Project crosses watercourses that drain to this SPA. An accidental pollution event during the Construction Phase, of a sufficient magnitude, could potentially have adverse effects on wetland habitats in the SPA. Although unlikely, given the SPA is more than 6km from the Proposed Project, there remains a risk that INNS capable of colonising wetland habitats could be spread, via the surface water network, to the River Shannon and River Fergus Estuaries SPA. These impacts could potentially affect the quality of the wetland habitat that supports these special conservation interest species in the River Shannon and River Fergus Estuaries SPA, which in turn could affect the number and range of areas used by the Wildfowl and population numbers.	Yes Measures to prevent the spread of INNS would be implemented to ensure they are not introduced to the River Shannon and River Fergus Estuaries SPA (Section 7.15.4). Measures to maintain water quality in receiving watercourses during the Construction Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on habitats in the River Shannon and River Fergus Estuaries SPA are avoided (Section 7.15.4).	No potential for effects, following the implementation of mitigation measures.
Wetland habitat quality and functioning (Quality and function of the wetland habitat)	No significant impact on the quality or functioning of the wetland habitat within the SPA, other than that occurring from natural patterns of variation			

7.15.4 Design Requirements and Mitigation Measures

1472. The positioning of the infrastructure associated with the Proposed Project has been designed to avoid European sites, where possible, and to minimise the risks of indirect effects as far as is possible. The design measures are described in Section 3.5.

7.15.4.1 Construction Phase Mitigation

1473. The mitigation measures to protect water quality in the receiving environment during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example: the use of sandbags, silt curtains or similar barriers, buffers of natural uncleared vegetation, and suspension of works within and adjacent to watercourses during periods of heavy rainfall. Such mitigation measures are considered best practice and are in accordance with IFI (2016) guidelines

1474. The mitigation measures to ensure that INNS are not spread or introduced to the River Shannon and River Fergus Estuaries SPA during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example, the thorough cleaning of plant and equipment using a power washer unit prior to leaving site, in accordance with the OPW Environmental Standard Operating Procedures (OPW 2011) and/or IFI Biosecurity Protocols (IFI 2010).

7.15.4.2 Operational Phase Mitigation

1475. The mitigation measures to protect water quality in the receiving environment during the Operational Phase are similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

1476. The mitigation measures to ensure that INNS are not spread or introduced to the River Shannon and River Fergus Estuaries SPA during the Operational Phase are also similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1) and in Chapter 5 of the EIAR (Construction & Commissioning).

7.15.5 Residual Impacts

1477. The Proposed Project has the potential to negatively affect water quality in the receiving surface water environment during the Construction Phase and the Operational Phase and, as watercourses crossed by the Proposed Project drain to the River Shannon, there is the potential for the conservation objectives of the River Shannon and River Fergus Estuaries SPA to be negatively affected. Mitigation measures will be implemented to ensure that the receiving surface water network is protected and the conservation objectives of the River Shannon and River Fergus Estuaries SPA are not negatively affected by the Proposed Project.

1478. The Proposed Project has the potential to spread and introduce INNS to the River Shannon and River Fergus Estuaries SPA via the watercourses that drain to the River Shannon. Mitigation measures will be implemented to ensure that any INNS present within the Construction Working Width or the 20m wide Permanent Wayleave are controlled and are not spread to the River Shannon and River Fergus Estuaries SPA, and that the conservation objectives of the River Shannon and River Fergus Estuaries SPA are not negatively affected by the Proposed Project.

1479. Therefore, there are no residual direct or indirect impacts associated with the Proposed Project that could adversely affect the integrity of the River Shannon and River Fergus Estuaries SPA.

7.15.6 Conclusion of Assessment for River Shannon and River Fergus Estuaries SPA 4077

1480. None of the potential direct or indirect impacts associated with the Proposed Project would affect the conservation objectives of the special conservation interests of the River Shannon and River Fergus Estuaries SPA. Mitigation measures are included to ensure that water quality in the receiving surface water environment is protected and that INNS are not spread or introduced to the River Shannon and River Fergus Estuaries SPA.

1481. The examination, analysis and evaluation covered all relevant information in respect of the special conservation interest species of the SPA. This included the potential impacts, mitigation and prevention measures and whether or not the predicted impacts would affect the conservation objectives that support the conservation condition for the special conservation interest species concerned (either directly or indirectly; refer to Section 8 for the in-combination assessment). It has been concluded beyond reasonable scientific doubt that, subject to the implementation of mitigation measures, the Proposed Project would not adversely affect the integrity of the River Shannon and River Fergus Estuaries SPA.

7.16 Slieve Aughty Mountains SPA 4168

7.16.1 Special Conservation Interest Species and Conservation Objectives of Slieve Aughty Mountains SPA 4168

1482. The special conservation interest species of the Slieve Aughty Mountains SPA, and the overall conservation objective for each, are listed in Table 7.48.

Table 7.48: Special Conservation Interests and Conservation Objectives of Slieve Aughty Mountains SPA (NPWS 2022d)

Special Conservation Interests	Conservation Objectives
Hen harrier (*Circus cyaneus*) [A082]	To maintain or restore favourable conservation condition of the bird species
Merlin (*Falco columbarius*) [A098]	

1483. In conjunction with considering the generic conservation objective, to maintain or restore the favourable conservation condition of the Annex I species for which the SPA has been selected, the available site-specific conservation objectives document for the Slieve Aughty Mountains SPA (NPWS 2022d) also informed this assessment. This document sets out the attributes, measures and targets that define the favourable conservation condition of the special conservation interest species within the European site.

7.16.2 Ecological Baseline Description for Slieve Aughty Mountains SPA 4168

1484. The Slieve Aughty Mountains SPA is a very large site that extends southwards from just south of Lough Rea, County Galway to Scariff in County Clare. The peaks are not notably high or indeed pronounced; the site rises to a maximum 400m at Maghera west of Lough Graney. The site includes many small and medium-sized lakes, notably Lough Graney and Lough Atorick; several important rivers rise in the site, including the Owendalulleegh and Graney. Lough Derg is immediately to the south-east. The Slieve Aughty Mountains predominantly comprise Old Red Sandstone, but outliers of Lower Palaeozoic rocks provide occasional outcrops capping the hills (DAGH 2015c).

1485. The site consists of a variety of upland habitats, though approximately half is afforested. The coniferous forests include first and second rotation plantations, with both pre-thicket and post-thicket stands present. Substantial areas of clear-fell are also present at any one time. The principal tree species present are Sitka spruce and lodgepole pine. Almost one-third of the site is unplanted blanket bog and heath, with both wet and dry heath present. Well-developed blanket bog occurs at several locations, notably Sonnagh, Loughatorick South and Glendree (DAGH 2015c).

1486. The vegetation is characterised by such species as ling heather, bilberry, common cottongrass (*Eriophorum angustifolium*), hare's-tail cottongrass (*Eriophorum vaginatum*), deergrass and especially purple moor-grass. Bog mosses (*Sphagnum* spp.) are well-represented. The remainder of the site is mostly rough grassland that is used for hill farming. This varies in composition and includes some wet areas with rushes (*Juncus spp.*) and some areas subject to scrub encroachment (DAGH 2015c).

1487. The Slieve Aughty Mountains are a stronghold for hen harrier and support the second largest concentration in the country. A survey in 2005 recorded 27 pairs, which represents over 12% of the all-Ireland population. A somewhat lower count of between 15 and 23 pairs in the 1998-2000 period is considered to reflect poorer coverage then. The mix of forestry and open areas provides optimum habitat conditions for this rare bird, which is listed on Annex I of the Birds Directive. The early stages of new and second-rotation conifer plantations are the most frequently used nesting sites, though some pairs may still nest in tall heather of unplanted bogs and heath. Hen harriers will forage up to c.5km from the nest site, utilising open bog and moorland, young conifer plantations and hill farmland that is not too rank. Birds will often forage in openings and gaps within forests. In Ireland, small birds and small mammals appear to be the most frequently taken prey (DAGH 2015c).

1488. The site also supports a breeding population of merlin. The population size is not well known but is likely to exceed five pairs. Red grouse is found on many of the unplanted areas of bog and heath – this is a species that has declined in Ireland and is now Red-listed.

1489. The Slieve Aughty Mountains SPA is of ornithological significance, as it provides excellent nesting and foraging habitat for nationally important breeding populations of hen harrier and merlin, two species that are listed on Annex I of the Birds Directive. Some woodlands within the Slieve Aughty Mountains SPA are designated as Statutory Nature Reserves (DAGH 2015c).

1490. The Proposed Project boundary is located c.12.5km to the south-west of the Slieve Aughty Mountains SPA boundary and does not overlap with this European site. The hydrogeological ZoI of the Proposed Project does not extend to 12.5km upgradient and poses no risk of hydrogeological effects within the Slieve Aughty Mountains SPA. There are also no hydrological pathways connecting the Proposed Project with the Slieve Aughty Mountains SPA, as the SPA lies in a different sub-catchment of the River Shannon system to the Proposed Project.

7.16.3 Examination and Analysis of Potential Direct and Indirect Impacts

1491. As the Proposed Project does not overlap with the Slieve Aughty Mountains SPA, hen harrier habitat within the SPA would not be directly impacted. The Slieve Aughty Mountains SPA (and potential ex-situ sites) also lies beyond the ZoI of any hydrogeological, hydrological impacts or air quality impacts. The Operational Phase of the Proposed Project poses no risk of disturbing or displacing hen harrier, as none of the habitats within the ZoI of operational activities are suitable habitats for hen harrier.

1492. Although the traditional nesting habitat of the hen harrier is open heathland, in Ireland, newly established conifer plantations are important nesting and hunting habitat for hen harrier (e.g. first rotation and second rotation forest, thicket stage forest and clear-felled forest). Other habitats favoured by hen harrier for hunting are heathlands and rough grasslands. Improved grazing habitat is not favoured by hen harrier (Ruddock *et al.* 2016; Wilson *et al*. 2010).

1493. The core foraging range of breeding hen harrier is 2km (SNH 2016). The Proposed Project is c.12.5km away from the Slieve Aughty Mountains SPA and therefore, there would not be any impacts on hen harrier habitat within that core 2km zone that is important in supporting the breeding population.

1494. Hen harrier can have a maximum foraging range of up to 10km during the breeding season (SNH 2016). The Proposed Project is c.12.5km away from the Slieve Aughty Mountains SPA and therefore, there would not be any impacts on hen harrier habitat within the 10km zone that may also support the breeding population.

1495. The Proposed Project is more than 10km away from the Slieve Aughty Mountains SPA and there would not be any significant adverse effects on the hen harrier population of the Slieve Aughty Mountains SPA as there are no potential impact pathways.

1496. The core foraging range for Merlin during the breeding season is 5km (SNH 2016). The Proposed Project is more than 5km from the Slieve Aughty Mountains SPA with no potential impact pathways connecting it to the SPA site. Therefore, there would not be any significant adverse effects on the merlin population of the Slieve Aughty Mountains SPA.

7.16.3.1 Summary

1497. Table 7.49 presents a summary of the potential impacts on the special conservation interest species of the Slieve Aughty Mountains SPA as a result of the Proposed Project and how these impacts affect the site's conservation objectives. There are no special conservation interest species from this SPA present within the ZoI of the Proposed Project that could potentially be impacted.

Table 7.49: Special Conservation Interest Species of the Slieve Aughty Mountains SPA and Summary of Potential Impacts

Special Conservation Interests	Potential Impacts	
	Construction Phase	Operational Phase
Annex I Species		
Hen harrier (*Circus cyaneus*) [A082]	No potential for impacts associated with the Proposed Project to result in any significant adverse effects on the breeding hen harrier population of the Slieve Aughty Mountains SPA.	
Merlin (*Falco columbarius*) [A098]	No potential for impacts associated with the Proposed Project to result in any significant adverse effects on the breeding merlin population of the Slieve Aughty Mountains SPA.	

1498. The specific attributes and targets used to define the conservation objectives of the special conservation interest species of the Slieve Aughty Mountains SPA are presented in Table 7.50, along with the potential impacts associated with the Proposed Project. Those special conservation interests, and the supporting attributes, measures, and targets at risk of being affected by the Proposed Project are highlighted in blue.

Table 7.50: Potential Impacts on the Conservation Objectives of the Slieve Aughty Mountains SPA

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Hen harrier (*Circus cyaneus*) [A082] **To restore the favourable conservation condition of the species in the Slieve Aughty Mountains SPA, which is defined by the following list of attributes and targets:**				
Population size (number of confirmed breeding pairs)	Maintain numbers at or above 14–24 confirmed breeding pairs.	No At a distance of c.12.5km from the Slieve Aughty Mountains SPA site boundary, the Proposed Project site boundary lies beyond the potential core breeding (2km) and normal foraging (10km) ranges for the SPA's hen harrier population. Therefore, there are no risks of any significant adverse effects on population or a decrease in the numbers or range of areas used by hen harrier either within or outside of the SPA.	No	No potential for effects.
Productivity rate (number of fledged young per confirmed pair)	Restore at least 1.0–1.4 fledged young per confirmed pair.			
Spatial utilisation by breeding pairs (percentage)	Maintain at least 68-92% spatial utilisation of the SPA by breeding pairs.			
Extent and condition of heath and bog and associated habitats (hectares; condition assessment)	Restore the extent and quality of this resource to support the targets relating to population size, productivity rate and spatial utilisation.			
Extent and condition of low intensity managed grasslands and associated habitats (hectares; condition assessment)	Restore the extent and quality of this resource to support the targets relating to population size, productivity rate and spatial utilisation.			
Extent and condition of hedgerows (kilometres; condition assessment)	Maintain at least the length and quality of this resource to support the targets relating to population size, productivity rate and spatial utilisation.			
Age structure of forest estate (percentage)	Achieve an even and consistent distribution of age-classes across the forest estate.			
Disturbance to breeding sites (level of impact)	Disturbance occurs at levels that do not significantly impact upon breeding hen harrier.			

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Merlin (*Falco columbarius*) [A098] **To maintain the favourable conservation condition of the species in the Slieve Aughty Mountains SPA, which is defined by the following list of attributes and targets:**				
Population size (number of occupied territories)	The breeding population is stable or increasing	No At a distance of c.12.5km from the Slieve Aughty Mountains SPA site boundary, the Proposed Project site boundary lies beyond the normal foraging (5km) ranges for the SPA's merlin population. Therefore, there are no risks of significant adverse effects on population or a decrease in the numbers or range of areas used by merlin either within or outside of the SPA.	No	No potential for effects.
Productivity rate (number of fledged young per breeding attempt with known outcome)	Sufficient to at least maintain population			
Distribution: extent of available nesting options within the SPA (numbers and spatial distribution)	Sufficient availability of suitable nesting sites throughout the SPA to maintain the population			
Extent and condition of suitable open habitats for foraging (hectares; condition assessment)	Sufficient availability of suitable foraging habitat across the SPA to support the targets relating to population size, productivity rate and range.			
Disturbance to breeding sites (level of impact)	Disturbance occurs at levels that do not significantly impact upon breeding merlin.			

7.16.4 Design Requirements and Mitigation Measures

1499. The positioning of the infrastructure associated with the Proposed Project has been designed to avoid European sites, where possible, and to minimise the risks of indirect effects as far as is possible. The design measures are described in Section 3.5.

1500. As the Proposed Project would not have any effects on the populations of hen harrier or merlin in the Slieve Aughty Mountains SPA, mitigation measures are not needed.

7.16.5 Residual Impacts

1501. The Proposed Project is c.12.5km from the Slieve Aughty Mountains SPA and there would not be any significant adverse effects on the SPA's hen harrier or merlin populations as there are no potential impact pathways.

1502. There are therefore, no residual direct or indirect impacts associated with the Proposed Project that could adversely affect the integrity of the Slieve Aughty Mountains SPA.

7.16.6 Conclusion of Assessment for Slieve Aughty Mountains SPA 4168

1503. None of the potential direct or indirect impacts associated with the Proposed Project would affect the conservation objectives of the Slieve Aughty Mountains SPA's hen harrier or merlin populations.

1504. The examination, analysis and evaluation covered all relevant information in respect of the special conservation interest species of the SPA. This included the potential impacts, prevention design measures (e.g. route selection) and whether or not the predicted impacts would affect the conservation objectives that support the conservation condition for the special conservation interest species concerned (either directly or indirectly; refer to Section 8 for the in-combination assessment). It has been concluded beyond reasonable scientific doubt that, the Proposed Project would not adversely affect the integrity of the Slieve Aughty Mountains SPA.

7.17 River Boyne and River Blackwater SPA 4232

7.17.1 Special Conservation Interest Species and Conservation Objectives of River Boyne and River Blackwater SPA 4168

1505. The special conservation interest species of the River Boyne and River Blackwater SPA, and the overall conservation objective for it, is presented in Table 7.51.

Table 7.51: Special Conservation Interests and Conservation Objectives of River Boyne and River Blackwater SPA (NPWS 2024b)

Special Conservation Interests	Conservation Objectives
Kingfisher (*Alcedo atthis*) [A229] (Breeding)	To maintain favourable conservation condition of the bird species

1506. In conjunction with considering the generic conservation objective, to maintain or restore the favourable conservation condition of the Annex I species for which the SPA has been selected, the available site-specific conservation objectives document for the River Boyne and River Blackwater SPA (NPWS 2024b) also informed this assessment. This document sets out the attributes, measures and targets that define the favourable conservation condition of the special conservation interest species within the European site.

7.17.2 Ecological Baseline Description for River Boyne and River Blackwater SPA 4168

1507. The River Boyne and River Blackwater SPA is a long, linear site that comprises stretches of the River Boyne and several of its tributaries; most of the site is in County Meath, but it extends also into Counties Cavan, Louth and Westmeath. It includes the following river sections: the River Boyne from the M1 motorway bridge west of Drogheda, to the junction with the Royal Canal, west of Longwood, County Meath; the River Blackwater from its junction with the River Boyne in Navan to the junction with Lough Ramor in County Cavan; the Tremblestown River/Athboy River from the junction with the River Boyne at Kilnagross Bridge west of Trim to the bridge in Athboy, County Meath; the Stoneyford River from its junction with the River Boyne to Stonestown Bridge in County Westmeath; and the River Deel from its junction with the River Boyne to Cummer Bridge, County Westmeath. The site includes the river channel and marginal vegetation (DAHG 2010).

1508. A survey in 2010 recorded 19 pairs of kingfisher (based on 15 probable and four possible territories) in the River Boyne and River Blackwater SPA. A survey conducted in 2008 recorded 20-22 kingfisher territories within the SPA. Other species which occur within the site include mute swan (90), teal (166), mallard (219), cormorant (36), grey heron (*Ardea cinerea*) (44), moorhen (84), snipe (32) and sand martin (*Riparia riparia*) (553). All figures are peak counts recorded during the 2010 survey (DAHG 2010).

1509. The River Boyne and River Blackwater SPA is of high ornithological importance as it supports a nationally important population of kingfisher, a species that is listed on Annex I of the Birds Directive (DAHG 2010).

1510. The Proposed Project boundary is located 13.1km south of the River Boyne and River Blackwater SPA site boundary and does not overlap with this European site. The hydrogeological ZoI of the Proposed Project does not extend to 13.1km and poses no risk of hydrogeological effects within the River Boyne and River Blackwater SPA. However, the Proposed Project does cross watercourses in the Blackwater [Longwood] River catchment that drain to the River Boyne and River Blackwater SPA more than 13km away (refer to Appendix J: Watercourse Crossings and Pathways to European Sites, for more details and EIAR Figure 8.4 to Figure 8.108 for the locations of the watercourse crossings).

7.17.3 Examination and Analysis of Potential Direct and Indirect Impacts

1511. As the Proposed Project does not overlap with the River Boyne and River Blackwater SPA, none of the habitats within the SPA (and potential ex-situ sites) that support the kingfisher population would be directly impacted. The River Boyne and River Blackwater SPA site boundary is approximately 13.1km directly north of the Proposed Project and more than 14km from where the Proposed Project crosses watercourses that drain to this SPA and therefore, lies beyond the ZoI of any hydrogeological, air quality or disturbance/displacement impacts that might affect kingfisher on the River Boyne.

1512. However, in the absence of mitigation measures, the Proposed Project's impacts described in the following sections could potentially affect the conservation objective attributes and targets supporting the conservation condition of the kingfisher population of the River Boyne and River Blackwater SPA.

7.17.3.1 Construction Phase

7.17.3.1.1 Habitat Degradation as a Result of Excavation and Tunnelling

1513. The only influence tunnelling or excavation works associated with the Proposed Project could have on the River Boyne and River Blackwater SPA is indirectly during the pipeline installation works at the watercourse crossings, where there is a risk of water quality impacts in the receiving watercourses regardless of whether open cut or trenchless techniques are used. This is discussed further below in the hydrological impacts section.

7.17.3.1.2 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1514. As the Proposed Project crosses watercourses that drain to the Blackwater [Longwood] River catchment and the River Boyne and River Blackwater SPA, construction works at these watercourse crossings pose a risk of affecting water quality in the European site through increasing silt-sediment loading, accidental spillage of cement-based products, accidental spillage of hydrocarbons or through faecal contamination arising from on-site toilets and washing facilities.

1515. Affecting water quality in receiving watercourses and in the River Boyne and River Blackwater SPA has the potential to affect the conservation objectives supporting the conservation condition of the special conservation interest kingfisher population that is associated with the River Boyne.

7.17.3.1.3 Disturbance

1516. Kingfisher territories usually cover at least 1km of river channel but may extend up to 5km or more which is consistent with the territories mapped on the River Boyne in 2010 (Cummins *et al.* 2010) where kingfisher territory densities on the River Boyne ranged from 0.09-0.10 territories per kilometre (or approximately one territory per 10km-11km). The Proposed Project lies more than 20km from the River Boyne and River Blackwater SPA and therefore, kingfisher territories, even if they were to extend upstream beyond the SPA boundary, would not be affected by any temporary disturbance associated with in-stream works on the Blackwater [Longwood] River catchment during the Construction Phase. Therefore, there would not be any significant adverse effects on the River Boyne and River Blackwater SPA kingfisher population due to construction-related disturbance.

7.17.3.2 Operational Phase

7.17.3.2.1 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1517. Although there would not be any routine discharges to the surface water network during the Operational Phase, Washout Valves would be located along the pipeline to facilitate planned repair and maintenance works (every 20-25 years). The water will be dechlorinated before discharge using dechlorination chemicals and there is therefore a risk to water quality in receiving watercourses from accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. Repair and maintenance works may require excavations to repair or replace sections of pipeline which pose a risk of affecting water quality in the surface water network.

1518. Affecting water quality in receiving watercourses and in the River Boyne and River Blackwater SPA has the potential to affect the conservation objectives supporting the conservation condition of the SPA's kingfisher population.

7.17.3.3 Summary

1519. Table 7.52 presents a summary of the potential impacts on the special conservation interest species of the River Boyne and River Blackwater SPA as a result of the Proposed Project and how these impacts affect the site's conservation objectives. Those highlighted in blue are the special conservation interest species which are present within the ZoI of the Proposed Project that could potentially be impacted.

Table 7.52: Special Conservation Interest Species of the River Boyne and River Blackwater SPA and Summary of Potential Impacts

Special Conservation Interests	Potential Impacts	
	Construction Phase	Operational Phase
Annex I Species		
Kingfisher (*Alcedo atthis*) [A229] (Breeding)	Habitat degradation – water quality impacts	Habitat degradation – water quality impacts

1520. The specific attributes and targets used to define the conservation objectives of the special conservation interest species of the River Boyne and River Blackwater SPA are presented in Table 7.53, along with the potential impacts associated with the Proposed Project. Those special conservation interests, and the supporting attributes, measures, and targets at risk of being affected by the Proposed Project are highlighted in blue.

Table 7.53: Potential Impacts on the Conservation Objectives of the River Boyne and River Blackwater SPA

Attributes and Measures	Target	Potential Impacts Requiring Mitigation?	Are Mitigation Measures Required?	Conclusion
Kingfisher (*Alcedo atthis*) [A229] (Breeding) **To maintain the favourable conservation condition of the species in the River Boyne and River Blackwater SPA, which is defined by the following list of attributes and targets:**				
Population size (number of breeding territories/pairs)	No significant decline in the long term.	Yes The River Boyne and River Blackwater SPA site boundary lies more than 14km from where the Proposed Project crosses watercourses that drain to this SPA. An accidental pollution event during the Construction Phase, of a sufficient magnitude, could potentially have significant adverse effects on water quality in the River Boyne. These impacts could potentially affect the quality of the aquatic habitat, reducing the abundance of prey species (fish) that support the kingfisher population of the River Boyne and River Blackwater SPA.	Yes Measures to maintain water quality in receiving watercourses during the Construction Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on habitats in River Boyne and River Blackwater SPA are avoided (Section 7.17.4).	No potential for effects, following the implementation of mitigation measures.
Productivity rate (number of fledged young per confirmed breeding pair)	Sufficient productivity to maintain the population trend as stable or increasing.			
Spatial distribution of territories (numbers and distribution of occupied territories across site)	No significant loss of distribution in the long term, other than that occurring due to natural patterns of variation.			
Forage spatial distribution, extent, abundance and availability (location, hectares, and forage biomass)	Sufficient number of locations, area of suitable forage habitat and available forage biomass to support the population target.			
Water quality (water quality indicators)	Both biotic (i.e. Q-value) and abiotic indices reflect overall good-high quality status.			
Extent and quality of nesting banks and other suitable nesting features (hectares; condition assessment)	Sufficient area of high-quality nesting habitat to support the population target.	No At a distance of 14km from the Proposed Project boundary and with no spatial overlap with the SPA, there is no potential to affect the extent or quality of suitable kingfisher nesting habitat within the SPA. Similarly, there is no potential to create a barrier to connectivity or cause disturbance effects on kingfisher within the SPA.	No	No potential for effects.
Barriers to connectivity (number, location, shape and hectares)	No significant increase.			
Disturbance to breeding sites (intensity, frequency, timing and duration)	Disturbance occurs at levels that do not significantly impact upon breeding kingfisher.			

7.17.4 Design Requirements and Mitigation Measures

1521. The positioning of the infrastructure associated with the Proposed Project has been designed to avoid European sites, where possible, and to minimise the risks of indirect effects as far as is possible. The design measures are described in Section 3.5.

7.17.4.1 Construction Phase Mitigation

1522. The mitigation measures to protect water quality in the receiving environment during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example: the use of sandbags, silt curtains or similar barriers, buffers of natural uncleared vegetation, and suspension of works within and adjacent to watercourses during periods of heavy rainfall. Such mitigation measures are considered best practice and are in accordance with IFI (2016) guidelines.

7.17.4.2 Operational Phase Mitigation

1523. The mitigation measures to protect water quality in the receiving environment during the Operational Phase are similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

7.17.5 Residual Impacts

1524. The Proposed Project has the potential to negatively affect water quality in the receiving surface water environment during the Construction Phase and the Operational Phase, and as watercourses crossed by the Proposed Project drain to the River Boyne, there is the potential for the conservation objectives of the River Boyne and River Blackwater SPA to be negatively affected. Mitigation measures will be implemented to ensure that the receiving surface water network is protected and the conservation objectives of the River Boyne and River Blackwater SPA are not negatively affected by the Proposed Project.

1525. Therefore, there are no residual direct or indirect impacts associated with the Proposed Project that could adversely affect the integrity of the River Boyne and River Blackwater SPA.

7.17.6 Conclusion of Assessment for River Boyne and River Blackwater SPA 4168

1526. None of the potential direct or indirect impacts associated with the Proposed Project would affect the conservation objectives of the special conservation interest kingfisher population of the River Boyne and River Blackwater SPA. Mitigation measures are included to ensure that water quality in the receiving surface water environment is protected during the Construction Phase.

1527. The examination, analysis and evaluation covered all relevant information in respect of the special conservation interest species of the SPA. This included the potential impacts, mitigation and prevention measures and whether or not the predicted impacts would affect the conservation objectives that support the conservation condition for the special conservation interest species concerned (either directly or indirectly; refer to Section 8 for the in-combination assessment). It has been concluded beyond reasonable scientific doubt that, subject to the implementation of mitigation measures, the Proposed Project would not adversely affect the integrity of the River Boyne and River Blackwater SPA.

7.18 Poulaphouca Reservoir SPA 4063

7.18.1 Special Conservation Interest Species and Conservation Objectives of Poulaphouca Reservoir SPA 4063

1528. The special conservation interest species of the Poulaphouca Reservoir SPA, and the overall conservation objective for each, are listed in Table 7.54.

Table 7.54: Special Conservation Interests and Conservation Objectives of Poulaphouca Reservoir SPA (NPWS 2024c)

Special Conservation Interests	Conservation Objectives
Greylag goose (*Anser anser*) [A043] (Wintering)	To restore favourable conservation condition of the bird species
Lesser black-backed gull (*Larus fuscus*) [A183] (Wintering)	To maintain favourable conservation condition of the bird species

1529. In conjunction with considering the generic conservation objective, to maintain or restore the favourable conservation condition of the Annex I species for which the SPA has been selected, the available site-specific conservation objectives document for the Poulaphouca Reservoir SPA (NPWS 2024c) also informed this assessment. This document sets out the attributes, measures and targets that define the favourable conservation condition of the special conservation interest species within the European site.

7.18.2 Ecological Baseline Description for Poulaphouca Reservoir SPA 4063

1530. Poulaphouca Reservoir SPA, located in the western foothills of the Wicklow Mountains, was created in 1944 by damming of the River Liffey for the purpose of generating electricity from hydropower. The reservoir covers an area of approximately 20 square kilometres and is the largest inland water body in the mid-east and south-east regions. The reservoir receives water from two main sources, the River Liffey at the northern end, and the King's River at the southern end. The exit is into the River Liffey gorge at the western end. Underlying the reservoir are sands and gravels deposited during the last glaciation. The shores of the lake are mostly sandy. When water levels are low the exposed lake muds are colonised by an ephemeral flora of annual plant species. Wet grassland areas occur in sheltered bays around the lake but especially in the northern part. Reed canary-grass is the main grass species present, but other plant species characteristic of wet grasslands occur, including creeping bent, meadowsweet, yellow iris and water mint. Sedges (*Carex spp*.) are locally common, while rusty willow scrub is often found associated with the wet grassland. In some places the water washes against grassy banks which are generally less than a metre high, and in a few places, there are steep sand and clay cliffs, up to 15m high - these are remnants of the old River Liffey channel. In many places the banks are actively eroding, and a strip of conifers has been planted around much of the perimeter of the reservoir in an attempt to stabilise the banks (DAHG 2014e).

1531. Poulaphouca Reservoir is of national importance for its greylag goose population, which is one of the largest in the country. The site provides the main roost for the birds, with feeding occurring mostly on improved grassland outside of the site. A mean peak of 701 individuals occurred during the five seasons 1995/96 to 1999/2000. Other waterfowl species occur in relatively low numbers, including whooper swan (22), wigeon (180), teal (107), mallard (186), goldeneye (22), cormorant (11), great crested grebe (eight), curlew (86) and mute swan (11). The site is also used by grey heron (six) (DAHG 2014e).

1532. The reservoir attracts roosting gulls during winter, most notably a large population of lesser black-backed gull (651), which in Ireland is rare in winter away from the south coast. Black-headed gull (915) and common gull (183) also occur (DAHG 2014e).

1533. Breeding birds at the site include great crested grebe (several pairs), which is localised in its distribution in eastern Ireland, as well as snipe and lapwing (DAHG 2014e).

1534. The principal interest of the site is the greylag goose population, which is of national importance. A range of other wildfowl species also occurs, including whooper swan, a species that is listed on Annex I of the Birds Directive. The site is also notable as a winter roost for gulls, especially lesser black-backed gull. Part of Poulaphouca Reservoir SPA is a wildfowl sanctuary (DAHG 2014e).

1535. The Proposed Project boundary is located c.14.6km north of Poulaphouca Reservoir SPA site boundary and does not overlap with this European site. The hydrogeological ZoI of the Proposed Project does not extend to 14.6km upgradient and poses no risk of hydrogeological effects within Poulaphouca Reservoir SPA. The Proposed Project crosses watercourses within the River Liffey catchment but these are all downstream of the Poulaphouca Reservoir (refer to Appendix J: Watercourse Crossings and Pathways to European Sites, for more details and EIAR Figure 8.4 to Figure 8.108 for the locations of the watercourse crossings).

7.18.3 Examination and Analysis of Potential Direct and Indirect Impacts

1536. As the Proposed Project does not overlap with Poulaphouca Reservoir SPA, supporting habitats within the SPA (and potential ex-situ sites) would not be directly impacted. Poulaphouca Reservoir SPA also lies beyond the ZoI of any hydrogeological, hydrological impacts or air quality impacts. At a distance of almost 15km, the Proposed Project would not disturb or displace wintering birds at Poulaphouca Reservoir SPA. The Operational Phase of the Proposed Project poses no risk of disturbing or displacing wintering birds on Poulaphouca Reservoir, as none of the habitats within the ZoI of operational activities are important habitats for the wintering birds designated for this SPA.

1537. However, in the absence of mitigation measures, the Proposed Project's impacts described in the following sections could potentially affect the conservation objective attributes and targets supporting the conservation condition of the wintering bird populations of Poulaphouca Reservoir SPA.

7.18.3.1 Construction Phase

7.18.3.1.1 Habitat Loss and Disturbance Impacts Outside of the SPA Boundary

1538. As the Proposed Project boundary is c.14.6km from Poulaphouca Reservoir SPA site boundary, it could potentially provide supporting habitat to special conservation interest species for which this site is designated. Greylag geese have a core foraging range of 15-20km during the winter (SNH 2016) and similarly, lesser black-backed gull are known to forage over large distances (Lloyd *et al*. 2010). Therefore, connectivity could exist between the Proposed Project and this SPA for these species for which the site was designated. The construction of the Proposed Project could result in a reduction of supporting habitat for this species and construction activities may result in effective habitat loss through disturbance and displacement effects.

1539. Considering a buffer of up to 20km to encompass lands potentially used by some of the special conservation interest species outside of Poulaphouca Reservoir SPA, this covers an area of more than 1,700km^2. Of that area, the Proposed Project would directly impact c.2.7km^2 of habitat. However, the majority of habitat loss within 20km of the Proposed Project would be temporary (up to 18 months) with all of the habitat affected by the pipeline installation works to be reinstated post-construction, and reinstated habitat would likely continue to be managed by the landowners in line with its current agricultural use. Potential disturbance impacts within this 20km zone would also be temporary.

1540. Given the temporary nature of the construction works and habitat impacts, and the relatively small area of habitat that would be temporarily affected during the Construction Phase in comparison to the total area surrounding the SPA that remains available to the wintering bird populations, there would not be any significant adverse effects on the wintering bird populations of Poulaphouca Reservoir SPA due to either habitat loss impacts or disturbance effects during the Construction Phase.

7.18.3.2 Summary

1541. Table 7.55 presents a summary of the potential impacts on the special conservation interest species of the Poulaphouca Reservoir SPA as a result of the Proposed Project and how these impacts affect the site's conservation objectives. There are no special conservation interest species from this SPA present within the ZoI of the Proposed Project that could potentially be impacted.

Table 7.55: Special Conservation Interest Species of the Poulaphouca Reservoir SPA and Summary of Potential Impacts

Special Conservation Interests	Potential Impacts	
	Construction Phase	Operational Phase
Annex I Species		
Greylag goose (*Anser anser*) [A043] (Wintering)	No potential for impacts associated with the Proposed Project to result in any significant adverse effects on the wintering bird populations of the Poulaphouca Reservoir SPA.	
Lesser black-backed gull (*Larus fuscus*) [A183] (Wintering)		

1542. The specific attributes and targets used to define the conservation objectives of the special conservation interest species of the Poulaphouca Reservoir SPA are presented in Table 7.56, along with the potential impacts associated with the Proposed Project. Those special conservation interests, and the supporting attributes, measures, and targets at risk of being affected by the Proposed Project are highlighted in blue.

Table 7.56: Potential Impacts on the Conservation Objectives of the Poulaphouca Reservoir SPA

Attributes and Measures	**Target**	**Potential Impacts Requiring Mitigation?**	**Are Mitigation Measures Required?**	**Conclusion**
Greylag goose (*Anser anser*) [A043] (Wintering) **Lesser black-backed gull (*Larus fuscus*) [A183] (Wintering)** **To maintain or restore the favourable conservation condition of the species in Poulaphouca Reservoir SPA, which is defined by the following list of attributes and targets:**				
Winter population trend (percentage change in number of individuals)	Long-term winter population trend is stable or increasing.	No At a distance of 14.6km directly away from Poulaphouca Reservoir SPA site boundary, the Proposed Project outside the ZoI for hydrological and INNS effects and lies at the edge of the normal winter foraging range for these species. Given these species utilise improved agricultural grassland, a habitat type which is common throughout the wider landscape, and the relatively minor scale of habitat loss (both permanent and temporary) associated with the Proposed Project, there are no risks of any significant adverse population effects or a decrease in the numbers or range of areas used by these species outside of the SPA.	No	No potential for effects.
Winter spatial distribution (hectares, time and intensity of use)	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target.			
Forage spatial distribution, extent and abundance (location and hectares, and available forage biomass)	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target.			
Supporting habitat: area and quality (hectares and quality)	Sufficient area of utilisable habitat available in ecologically important sites outside the SPA.			
Disturbance at wintering site (intensity, frequency, timing and duration)	The intensity, frequency, timing and duration of disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution.			
Barriers to connectivity and site use (number, location, shape and hectares)	The number, location, shape and area of barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA.			
Roost spatial distribution and extent (location and hectares of roosting habitat)	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target.			

7.18.4 Design Requirements and Mitigation Measures

1543. The positioning of the infrastructure associated with the Proposed Project has been designed to avoid European sites, where possible, and to minimise the risks of indirect effects as far as is possible. The design measures are described in Section 3.5.

1544. Habitat loss impacts associated with installing the pipeline would be temporary as habitat areas directly affected would be reinstated post-construction.

1545. As the Proposed Project would not have any effects on the wintering bird populations of Poulaphouca Reservoir SPA, mitigation measures are not needed.

7.18.5 Residual Impacts

1546. Although the Proposed Project would result in direct impacts on, and may displace birds from, habitats within the potential range of wintering birds in Poulaphouca Reservoir SPA, the effects would be temporary.

1547. Therefore, there are no residual direct or indirect impacts associated with the Proposed Project that could adversely affect the integrity of the Poulaphouca Reservoir SPA.

7.18.6 Conclusion of Assessment for Poulaphouca Reservoir SPA 4063

1548. None of the potential direct or indirect impacts associated with the Proposed Project would affect the conservation objectives of Poulaphouca Reservoir SPA's wintering bird populations.

1549. The examination, analysis and evaluation covered all relevant information in respect of the special conservation interest species of the SPA. This included the potential impacts, prevention design measures (e.g. route selection) and whether or not the predicted impacts would affect the conservation objectives that support the conservation condition for the special conservation interest species concerned (either directly or indirectly; refer to Section 8 for the in-combination assessment). It has been concluded beyond reasonable scientific doubt that, the Proposed Project would not adversely affect the integrity of the Poulaphouca Reservoir SPA.

7.19 Middle Shannon Callows SPA 4096

7.19.1 Special Conservation Interest Species and Conservation Objectives of Middle Shannon Callows SPA 4096

1550. The special conservation interest species of the Middle Shannon Callows SPA, and the overall conservation objective for each, are listed in Table 7.57.

Table 7.57: Special Conservation Interests and Conservation Objectives of Middle Shannon Callows SPA (NPWS 2022f)

Special Conservation Interests	Conservation Objectives
Whooper swan (*Cygnus cygnus*) [A038] (Wintering)	To maintain favourable conservation condition of the bird species
Wigeon (*Anas penelope*) [A050] (Wintering)	To restore favourable conservation condition of the bird species
Corncrake (*Crex crex*) [A122] (Breeding)	The status of corncrake as a special conservation interest for the Middle Shannon Callows SPA is currently under review.
Golden plover (*Pluvialis apricaria*) [A140] (Wintering)	To maintain favourable conservation condition of the bird species
Lapwing (*Vanellus vanellus*) [A142] (Wintering and Breeding)	To restore favourable conservation condition of the bird species
Black-tailed godwit (*Limosa limosa*) [A156] (Wintering and Breeding)	To restore favourable conservation condition of the bird species
Black-headed gull (*Chroicocephalus ridibundus*) [A179] (Wintering)	To restore favourable conservation condition of the bird species
Wetland [A999]	To maintain the favourable conservation condition of the wetland habitat

1551. In conjunction with considering the generic conservation objective to maintain or restore the favourable conservation condition of the Annex I species for which the SPA has been selected, the available site-specific conservation objectives document for the Middle Shannon Callows SPA (NPWS 2022e) also informed this assessment. This document sets out the attributes, measures and targets that define the favourable conservation condition of the special conservation interest species within the European site.

7.19.2 Ecological Baseline Description for Middle Shannon Callows SPA 4096

1552. The Middle Shannon Callows SPA is a long and diverse site which extends for approximately 50km from the town of Athlone to the town of Portumna; it lies within Counties Galway, Roscommon, Westmeath, Offaly and Tipperary. The site averages about 0.75km in width though in places is up to 1.5km wide. Water levels on the site are greatly influenced by the very small fall between Athlone and Portumna and by the weir at Meelick. The site has extensive areas of callow, or seasonally flooded, semi-natural, lowland wet grassland, along both sides of the river. The callows are mainly too soft for intensive farming but are used for hay or silage or for summer grazing. Other habitats of smaller area which occur alongside the river include lowland dry grassland, freshwater marshes, reedbeds and wet woodland. The diversity of semi-natural habitats present and the sheer size of the site attract an excellent diversity of bird species, including significant populations of several (DAHG 2012).

1553. The site is a SPA under the Birds Directive, of special conservation interest for the following species: whooper swan, wigeon, corncrake, golden plover, lapwing, black-tailed godwit and black-headed gull. It is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for wetland & waterbirds (DAHG 2012).

1554. The Middle Shannon Callows SPA qualifies as a site of international importance as it regularly supports in excess of 20,000 wintering waterbirds (23,656 – four-year mean peak for four of the winters between 1995/96 and 1999/2000). The site also supports internationally important populations of whooper swan (305 – five-year mean peak for the period 1995/96 to 1999/2000) and black-tailed godwit (485 – four-year mean peak for four of the winters between 1995/96 and 1999/2000). Four further species of wintering waterbird occur in numbers of national importance, i.e. wigeon (3,059), golden plover (4,133), lapwing (13,240) and black-headed gull (1,209) – all figures are four year mean peaks for four of the winters between 1995/96 and 1999/2000 (DAHG 2012).

1555. The Middle Shannon Callows SPA is the largest site monitored as part of I-WeBS and many parts of it are inaccessible on the ground. Annual monitoring of the wintering waterbirds of the Middle Shannon Callows SPA is undertaken by aerial surveys in January/February with some areas also covered by ground counts. The importance of the site for some species may have been underestimated if count coverage missed the brief spring peaks for these species, e.g. peak counts of lapwing (23,409) and black-tailed godwit (1,096) recorded in the baseline period (1995/96 to 1999/2000) have been considerably higher than the four-year means. A wide range of other species occurs within the site, including mute swan (407), teal (88), tufted duck (41), dunlin (335), curlew (162) and redshank (39). Small numbers of Greenland white-fronted goose use the Middle Shannon Callows SPA (peak 55 in 1998/99) and these are generally associated with larger flocks which occur on the adjacent Little Brosna Callows and River Suck Callows. The callow grasslands provide optimum feeding grounds for these various species of waterfowl, while many of the birds also roost or rest within the site (DAHG 2012).

1556. The Middle Shannon Callows SPA is also an important site for breeding waders with the total population on the Shannon and Little Brosna Callows being one of three major concentrations in Ireland and Britain in 1987. Numbers of some species have declined since then but a survey of the Middle Shannon Callows SPA in 2002 recorded the following breeding waders - lapwing (63 pairs), redshank (116 pairs), snipe (139 drumming birds) and curlew (eight pairs). Black-tailed godwit, a very rare breeding species in Ireland, nests or attempts to nest in small numbers each year within the site. A further scarce breeding species, shoveler, also nests in small numbers each year (an estimated 12 pairs in 1987) (DAHG 2012).

1557. The Middle Shannon Callows SPA supports a breeding population of corncrake (19 pairs – five-year mean peak between 2003 and 2007, based on records of calling males). Corncrake winter in southern and eastern Africa, migrating northwards to arrive on their breeding grounds from early April onwards, departing again in August and September. They require the cover of tall vegetation throughout their breeding cycle and are strongly associated with meadows which are harvested annually, where they nest and feed. Annual cutting of these meadows creates a sward which is easy for the birds to move through. Other habitats, which can provide cover for corncrake in the early and late stages of the breeding season, are also important for this species. Corncrake is listed on the 2010 International Union for Conservation of Nature (IUCN) Red List of Threatened Species. This is due to population and range declines of more than 50% in the last 25 years across significant parts of its range. Quail, a related, scarce species, is also known to breed within the callow grasslands (DAHG 2012).

1558. A good variety of other bird species are attracted to the site. Birds of prey, including scarce species such as merlin and wintering hen harrier have been recorded hunting over the callows. A range of passerine species associated with grassland and swamp vegetation breed, including sedge warbler, grasshopper warbler (*Locustella naevia*), skylark (*Alauda arvensis*) and reed bunting (*Emberiza schoeniclus*). Kingfisher is also known to occur within the site. Whinchat (*Saxicola rubetra*), an uncommon breeding species, occurs in small numbers (DAHG 2012).

1559. The Middle Shannon Callows SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of two species - whooper swan and black-tailed godwit. In addition, there are four species that have wintering populations of national importance. The site also supports a nationally important breeding population of corncrake. Of

particular note is that several of the species which occur regularly are listed on Annex I of the Birds Directive, i.e. whooper swan, corncrake and golden plover (DAHG 2012).

1560. The Proposed Project boundary is located 18km south-east of the Middle Shannon Callows SPA site boundary and does not overlap with this European site. The hydrogeological ZoI of the Proposed Project does not extend to 18km and poses no risk of hydrogeological effects within Middle Shannon Callows SPA. However, the Proposed Project does cross a number of watercourses that drain to the Middle Shannon Callows SPA more than 17km away, including: the Little Brosna River (WCX026), the Rock [Birr] River (WCX027), the Breaghmore River (WCX031) and the Camcor River (WCX032), (refer to Appendix J: Watercourse Crossings and Pathways to European Sites, for more details and EIAR Figure 8.4 to Figure 8.108 for the locations of the watercourse crossings). The Proposed Project also crosses watercourses in the Brosna River catchment and these would also ultimately drain to Lough Derg via the River Shannon.

7.19.3 Examination and Analysis of Potential Direct and Indirect Impacts

1561. As the Proposed Project does not overlap with the Middle Shannon Callows SPA, the habitat supporting the special conservation interests within the SPA (and potential ex-situ sites) would not be directly impacted. The Middle Shannon Callows SPA also lies beyond the ZoI of any hydrogeological or air quality impacts. At a distance of 18km away, the Proposed Project would not disturb or displace wintering or breeding birds at the Middle Shannon Callows SPA. The Proposed Project is sufficiently removed from the Middle Shannon Callows SPA that it lies beyond the normal foraging range of any of the special conservation interest bird species. The Operational Phase of the Proposed Project poses no risk of disturbing or displacing wintering or breeding birds from the SPA, as none of the habitats within the ZoI of operational activities are important habitats for the wintering or breeding birds designated for this SPA.

1562. However, in the absence of mitigation measures, the Proposed Project's impacts described in the following sections could potentially affect the conservation objective attributes and targets supporting the conservation condition of the special conservation interest bird populations of the Middle Shannon Callows SPA.

7.19.3.1 Construction Phase

7.19.3.1.1 Habitat Degradation as a Result of Excavation and Tunnelling

1563. The only influence tunnelling or excavation works associated with the Proposed Project could have on the Middle Shannon Callows SPA is indirectly during the pipeline installation works at the watercourse crossings, where there is a risk of water quality impacts in the receiving watercourses regardless of whether open cut or trenchless techniques are used. This is discussed further below in the hydrological impacts section.

7.19.3.1.2 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1564. Hydrostatic pressure testing would be carried out on the Treated Water Pipelines. It is proposed to abstract water from eight water bodies along the route and use the abstracted 'test water' to pressure test the pipeline (Section 5.1.2.2). This water would then be discharged through the use of washouts to land or to water bodies, or tankered away where required. In addition, there are a total of 51 Line Valves along the pipeline route. Two of these are located on the RWRMs and the other 49 are located along the Treated Water Pipeline. The two Line Valves on the RWRMs would not have washouts. Twenty of the 49 Line Valves along the Treated Water Pipeline would have washouts. Washouts at Line Valves would only be used to discharge the sweetening flows during final filling in the Commissioning Phase and the washout design flow would vary between 1l/s and 4l/s. The water used to test the pipeline would be released via one of these 20 Line Valve Washouts. These are detailed in Annex A (Water Body Crossings and Washout Valves – Detailed Assessment) of EIAR Appendix A9.2 (Pipeline Assessment). Such

activities in the ZoI of the Middle Shannon Callows SPA or its tributaries may affect water quality in the European site and has the potential to affect the conservation objectives supporting the special conservation interest species and habitats hydrologically linked to the European site. Mitigation measures are detailed in Section 7.1.4.3.

1565. As the Proposed Project crosses watercourses that drain to the Middle Shannon Callows SPA, construction works at these watercourse crossings pose a risk of affecting water quality in the European site through an accidental spillage of cement-based products or accidental spillage of hydrocarbons.

1566. Affecting water quality in receiving watercourses and in the Middle Shannon Callows SPA has the potential to affect the conservation objectives supporting the conservation condition of the special conservation interest bird populations of the Middle Shannon Callows SPA.

7.19.3.1.3 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1567. As the Proposed Project would involve instream construction works on watercourses that drain to the Middle Shannon Callows SPA, there is the potential that INNS could be introduced to the surface water network and establish populations downstream in the European site.

1568. Introducing INNS to the Middle Shannon Callows SPA has the potential to affect the quality of the wetland habitat that supports the conservation condition of the special conservation interest bird populations of the Middle Shannon Callows SPA.

7.19.3.2 Operational Phase

7.19.3.2.1 Habitat Degradation as a Result of Hydrological Impacts/Water Quality Impacts

1569. Although there would not be any routine discharges to the surface water network during the Operational Phase, Washout Valves would be located along the pipeline to facilitate planned repair and maintenance works (every 20-25 years). The water will be dechlorinated before discharge using dechlorination chemicals and there is therefore a risk to water quality in receiving watercourses from accidental chemical spills from the Siltbuster mobile treatment unit (Section 7.1.4.3). Repair and maintenance works may require excavations to repair or replace sections of pipeline which pose a risk of affecting water quality in the surface water network.

1570. Affecting water quality in receiving watercourses and in the Middle Shannon Callows SPA has the potential to affect the conservation objectives supporting the conservation condition of the special conservation interest bird populations of the Middle Shannon Callows SPA.

7.19.3.2.2 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

1571. During the Operational Phase, repair and maintenance works may be required to sections of the pipeline within the Proposed Project, which cross watercourses that drain to the Middle Shannon Callows SPA. There is a risk that plant INNS may colonise lands within the 20m wide Permanent Wayleave post-construction and therefore, a risk that repair and maintenance works could potentially introduce INNS to the surface water network and establish populations downstream in the European site.

1572. Introducing INNS to the Middle Shannon Callows SPA has the potential to affect the quality of the wetland habitat that supports the conservation condition of the special conservation interest bird populations of the Middle Shannon Callows SPA.

7.19.3.3 Summary

1573. Table 7.58 presents a summary of the potential impacts on the special conservation interest species of the Middle Shannon Callows SPA as a result of the Proposed Project and how these impacts affect the site's conservation objectives. Those highlighted in blue are the special conservation interest species which are present within the ZoI of the Proposed Project that could potentially be impacted.

Table 7.58: Special Conservation Interest Species of the Middle Shannon Callows SPA and Summary of Potential Impacts

Special Conservation Interests	Potential Impacts	
	Construction Phase	Operational Phase
Whooper swan (*Cygnus cygnus*) [A038] (Wintering)	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
Wigeon (*Anas penelope*) [A050] (Wintering)		
Corncrake (*Crex crex*) [A122] (Breeding)	Corncrake is currently under review as special conservation interest species for the Middle Shannon Callows SPA, as there is evidence that the species may be extirpated from the Shannon Callows area, with no confirmed breeding since 2014 (NPWS 2024d). Additionally, this species does not depend on the habitats within the ZoI of the Proposed Project. Therefore, there is no potential for impacts associated with the Proposed Project to result in any significant adverse effects on the breeding corncrake population of the Middle Shannon Callows SPA.	
Golden plover (*Pluvialis apricaria*) [A140] (Wintering)	Habitat degradation – water quality impacts Habitat degradation – INNS	Habitat degradation – water quality impacts Habitat degradation – INNS
Lapwing (*Vanellus vanellus*) [A142] (Wintering)		
Black-tailed godwit (*Limosa limosa*) [A156] (Wintering)		
Black-headed gull (*Chroicocephalus ridibundus*) [A179] (Wintering)		
Wetland and waterbirds [A999]		

1574. The specific attributes and targets used to define the conservation objectives of the special conservation interest species of the Middle Shannon Callows SPA are presented in Table 7.59, along with the potential impacts associated with the Proposed Project. Those special conservation interests, and the supporting attributes, measures, and targets at risk of being affected by the Proposed Project are highlighted in blue.

Table 7.59: Potential Impacts on the Conservation Objectives of the Middle Shannon Callows SPA

Attributes and Measures	**Target**	**Potential Impacts Requiring Mitigation?**	**Are Mitigation Measures Required?**	**Conclusion**
Whooper swan (*Cygnus cygnus*) [A038], Wigeon (*Anas penelope*) [A050], Golden plover (*Pluvialis apricaria*) [A140], Lapwing (*Vanellus vanellus*) [A142], Black-tailed godwit (*Limosa limosa*) [A156], Black-headed gull (*Chroicocephalus ridibundus*) [A179] **To maintain or restore the favourable conservation condition of the species in the Middle Shannon Callows SPA, which is defined by the following list of attributes and targets:**				
Winter population trend (percentage change in number of individuals)	Long-term winter population trend is stable or increasing.	Yes The Middle Shannon Callows SPA boundary lies more than 17km from where the Proposed Project crosses watercourses that drain to this SPA. An accidental pollution event during the Construction Phase, of a sufficient magnitude, could potentially have significant adverse effects on wetland habitats in the SPA. Although unlikely, given the SPA is more than 17km from the Proposed Project, there remains a risk that INNS capable of colonising wetland habitats could be spread, via the surface water network, to the Middle Shannon Callows SPA. These impacts could potentially affect the quality of the wetland habitat that supports these special conservation interest species in the Middle Shannon Callows SPA, which in turn could affect the number and range of areas used by the geese and population numbers.	Yes Measures to prevent the spread of INNS would be implemented to ensure they are not introduced to Middle Shannon Callows SPA (Section 7.19.4). Measures to maintain water quality in receiving watercourses during the Construction Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on habitats in Middle Shannon Callows SPA are avoided (Section 7.19.4).	No potential for effects, following the implementation of mitigation measures.
Winter spatial distribution (hectares, time and intensity of use)	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target.			
Forage spatial distribution, extent and abundance (location and hectares, and available forage biomass)	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target.			
Supporting habitat: area and quality (hectares and quality)	Sufficient area of utilisable habitat available in ecologically important sites outside the SPA.			
Disturbance at wintering site (intensity, frequency, timing and duration)	The intensity, frequency, timing and duration of disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution.	No At a distance of more than 17km from the Proposed Project boundary there is no potential for disturbance effects on the special conservation interest species within the SPA. The Proposed Project would not cause a barrier to connectivity. The majority of elements to the Proposed Project would be located underground or of such a low profile, relative to the surrounding area, not to cause obstruction to commuting species from the SPA. There are no risks to overnight roosting sites used by the special conservation interest species within the SPA. No suitable wetlands or permanent water bodies such as lakes or estuaries suitable for roosting are located within or immediately adjacent to the Proposed Project and within commuting distance to the SPA.	No	No potential for effects.
Barriers to connectivity and site use (number, location, shape and hectares)	The number, location, shape and area of barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA.			
Roost spatial distribution and extent (location and hectares of roosting habitat)	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target.			

Attributes and Measures	**Target**	**Potential Impacts Requiring Mitigation?**	**Are Mitigation Measures Required?**	**Conclusion**
Corncrake (*Crex crex*) [A122] **The status of corncrake as a special conservation interest for the Middle Shannon Callows SPA is currently under review. The outcome of this review will determine whether a site-specific conservation objective is set for this species**				
N/A	N/A	N/A	N/A	N/A
Wetlands [A999] **To maintain the favourable conservation condition of wetlands in the Middle Shannon Callows SPA, which is defined by the following list of attributes and targets:**				
Wetland habitat area (hectares)	No significant loss to wetland habitat within the SPA, other than that occurring from natural patterns of variation.	Yes The Middle Shannon Callows SPA boundary lies more than 17km from where the Proposed Project crosses watercourses that drain to this SPA. An accidental pollution event during the Construction Phase, of a sufficient magnitude, could potentially have significant adverse effects on wetland habitats in the SPA. Although unlikely, given the SPA is more than 17km from the Proposed Project, there remains a risk that INNS capable of colonising wetland habitats could be spread, via the surface water network, to the Middle Shannon Callows SPA. These impacts could potentially affect the quality of the wetland habitat that supports these special conservation interest species in the Middle Callows SPA, which in turn could affect the number and range of areas used by the geese and population numbers.	Yes Measures to prevent the spread of INNS would be implemented to ensure they are not introduced to Middle Shannon Callows SPA (Section 7.19.4). Measures to maintain water quality in receiving watercourses during the Construction Phase would be implemented to ensure the receiving freshwater environment is protected and impacts downstream of the Proposed Project on habitats in Middle Shannon Callows SPA are avoided (Section 7.19.4).	No potential for effects, following the implementation of mitigation measures.
Wetland habitat quality and functioning (Quality and function of the wetland habitat)	No significant impact on the quality or functioning of the wetland habitat within the SPA, other than that occurring from natural patterns of variation			

7.19.4 Design Requirements and Mitigation Measures

1575. The positioning of the infrastructure associated with the Proposed Project has been designed to avoid European sites, where possible, and to minimise the risks of indirect effects as far as is possible. The design measures are described in Section 3.5.

7.19.4.1 Construction Phase Mitigation

1576. The mitigation measures to protect water quality in the receiving environment during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example: the use of sandbags, silt curtains or similar barriers, buffers of natural uncleared vegetation, and suspension of works within and adjacent to watercourses during periods of heavy rainfall. Such mitigation measures are considered best practice and are in accordance with IFI (2016) guidelines.

1577. The mitigation measures to ensure that INNS are not spread or introduced to the Middle Shannon Callows SPA during the Construction Phase are as detailed in Section 7.1.4 and in the CEMP (see EIAR Appendix A5.1) and include, for example, the thorough cleaning of plant and equipment using a power washer unit prior to leaving site, in accordance with the OPW Environmental Standard Operating Procedures (OPW 2011) and/or IFI Biosecurity Protocols (IFI 2010).

7.19.4.2 Operational Phase Mitigation

1578. The mitigation measures to protect water quality in the receiving environment during the Operational Phase are similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).

1579. The mitigation measures to ensure that INNS are not spread or introduced to the Middle Shannon Callows SPA during the Operational Phase are also similar to those required during testing and commissioning and are as detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1) and in Chapter 5 of the EIAR (Construction & Commissioning).

7.19.5 Residual Impacts

1580. The Proposed Project has the potential to negatively affect water quality in the receiving surface water environment during the Construction Phase and the Operational Phase and, as watercourses crossed by the Proposed Project drain to the River Shannon, there is the potential for the conservation objectives of the Middle Shannon Callows SPA to be negatively affected. Mitigation measures will be implemented to ensure that the receiving surface water network is protected and the conservation objectives of the Middle Shannon Callows SPA are not negatively affected by the Proposed Project.

1581. The Proposed Project has the potential to spread and introduce INNS to the Middle Shannon Callows SPA via the watercourses that drain to the River Shannon. Mitigation measures will be implemented to ensure that any INNS present within the Construction Working Width or the 20m wide Permanent Wayleave are controlled and are not spread to the Middle Shannon Callows SPA, and that the conservation objectives of the Middle Shannon Callows SPA are not negatively affected by the Proposed Project.

1582. Therefore, there are no residual direct or indirect impacts associated with the Proposed Project that could adversely affect the integrity of the Middle Shannon Callows SPA.

7.19.6 Conclusion of Assessment for Middle Shannon Callows SPA 4096

1583. None of the potential direct or indirect impacts associated with the Proposed Project would affect the conservation objectives of the special conservation interests of the Middle Shannon Callows SPA. Mitigation measures are included to ensure that water quality in the receiving surface water environment is protected and that INNS are not spread or introduced to the Middle Shannon Callows SPA.

1584. The examination, analysis and evaluation covered all relevant information in respect of the special conservation interest species of the SPA. This included the potential impacts, mitigation and prevention measures and whether or not the predicted impacts would affect the conservation objectives that support the conservation condition for the special conservation interest species concerned (either directly or indirectly; refer to Section 8 for the in-combination assessment). It has been concluded beyond reasonable scientific doubt that, subject to the implementation of mitigation measures, the Proposed Project would not adversely affect the integrity of the Middle Shannon Callows SPA.

8. In-Combination Assessment

8.1 Analysis of Potential In-Combination Effects

1585. This section of the NIS presents the assessment carried out to analyse and examine whether other plans or projects have the potential to act in-combination with the Proposed Project to adversely affect the integrity of European sites.

1586. Many European sites fall outside of the ZoI of the Proposed Project and therefore no possibility of in-combination effects arises in connection with these European sites. In the case of plans or projects which may potentially affect those European sites outside of the ZoI, they simply are not capable of having an in-combination effect with the Proposed Project and do not require further consideration. Plans and projects deemed to be relevant for the purposes of examining in-combination effects include those which have potential to impact on European sites which fall within the ZoI of the Proposed Project. In the case of the Proposed Project, for the large part, this has included plans and projects falling within the same water catchments which support European sites. A non-catchment-based analysis has also been used to identify additional plans and projects which may have potential to impact on European sites which fall within the ZoI of the Proposed Project, but for other impact pathways or sources. For example, other plans or projects in proximity to European sites which fall within the ZoI of the Proposed Project which might give rise to dust or air emissions, noise or other disturbance were considered for in-combination effects. Another example of plans or projects considered for in-combination effects are those which might have potential to impact on ex-situ qualifying interest/special conservation interest species for which European sites within the ZoI of the Proposed Project are designated.

1587. Plans or projects with the potential to impact upon European sites to be assessed for in-combination effects include national, regional and local land use plans as well as projects which are either existing, approved but not yet built or operational, or are foreseeable and have a reasonable prospect of being realised.

8.1.1 Approach/Methodology

1588. An initial long list of ‘other’ projects and plans which have the potential to overlap with the Proposed Project was collated by carrying out a desktop study, within the defined ZoI, using the most up to date data at the time of writing. The following sources were used to identify ‘other’ projects and plans:

- An Coimisiún Pleanála website – for Strategic Infrastructure Projects and Strategic Housing Developments
- Local authority websites through their consultation portal and the development plans for future planned projects for the following authorities: Clare County Council; Kildare County Council; Laois County Council; Limerick County Council; Offaly County Council; South Dublin County Council; and Tipperary County Council
- National Planning Application Database – for downloadable list of planning applications sent from local authorities (DHLGH n.d.)
- Project Ireland 2040 (Department for Public Expenditure, NDP Delivery and Reform 2024), which combines the National Development Plan (Government of Ireland 2021) and National Planning Framework (Government of Ireland 2019)
- The EIA Portal maintained by the Department of Housing, Planning and Local Government (DHPLG) – for applications for development consent accompanied by an EIAR (DHPLG n.d.)
- Eirgrid Network Delivery Portfolio for existing and planned projects through the quarterly publications (EirGrid 2024)
- Uisce Éireann’s website (Uisce Éireann n.d.) which includes a page on its projects
- The TII website (TII n.d.) – for major transport projects and programmes.

1589. Very minor planning applications were excluded from the long list on the basis that, given their minor nature, these were not likely to have an in-combination effect noticeable over the effects of the Proposed Project in isolation. Examples of planning applications which were excluded from the long list were applications to construct or demolish conservatories, house extensions, loft conversions, changes of use for single or small numbers of buildings, construction of outbuildings, modifications to driveways and retention applications for similar developments. Granted and pending applications older than 10 years were excluded from the long list on the basis that they would likely already have been built (and so would form part of the existing baseline) or are now unlikely to be progressed. Granted and pending applications in which their planning permission has expired, and no extension of time have been applied for were discounted as they are deemed unlikely to progress unless a new planning permission is being sought. Applications which have been refused, withdrawn or deemed invalid were discounted on the basis that they are unlikely to progress, unless through successful appeal or resubmission.

1590. The in-combination provision concerns 'other' projects and plans that have been already completed, approved but uncompleted, or proposed (i.e. for which an application for approval or consent has been submitted), however, the long list has gone further and has considered potential or 'known' projects and plans. This approach was undertaken as there is potential for a number of 'other' projects or plans to receive approval and be progressed within that time period which may give rise to in-combination effects with the Proposed Project. It was, therefore, considered appropriate to identify projects and plans which, at the time of assessment, were yet to be approved, but for which a decision and potentially approval is reasonably foreseeable over the likely consenting and construction period anticipated for the Proposed Project.

1591. For the purpose of the Proposed Project, the categories of 'other' projects and plans included in the in-combination assessment have been taken to include:

- Any approved and still implementable planning applications back-dated approximately 10 years from the time the planning search was undertaken (as it was assumed applications dated further in the past than this would have either been completed or are no longer likely to proceed) with the potential for in-combination effects with the Proposed Project
- Any projects or plans which, at the time of assessment, were yet to be approved, but for which a decision and potentially approval is reasonably foreseeable over the likely consenting and construction period anticipated for the Proposed Project
- Any other major developments that are currently subject to the pre-planning application and preliminary design phases to the extent possible where publicly available plans and particulars exist, with the potential for in-combination effects with the Proposed Project.

1592. The existing Ardnacrusha Generating Station is included in the baseline and therefore considered in the assessment of the Proposed Project in Section 5 and Section 7. As discussed in Section 3.5.11 and Section 5, ESB will facilitate the proposed abstraction of water by the Proposed Project within its current operating practices. As part of an overall agreement with ESB, water will be diverted to the Proposed Project abstraction from the flow that would otherwise have been used for electricity generation on a continuous year-round basis. Given this interaction with the Proposed Project, and the environmental importance of the Lower River Shannon SAC, Ardnacrusha Generating Station has also been considered within the in-combination assessment. However, it should be noted that the proposed change in the operational regime of Ardnacrusha will maintain the hydrological status quo, and therefore the in-combination effect with Ardnacrusha Generating Station would not differ to the effects assessed for the Proposed Project reported in Section 7.

1593. A 'tier' (1 or 2) was assigned to each of the 'other' projects and plans to indicate the level of certainty associated with its implementation, as detailed in Table 8.1. While the tiers provide an indication of the level of information available on which to base an assessment, the status of planning applications changes through time. Appendix L (Projects Considered for In-Combination Effects) provides an indication of the tier of each development at the time of assessment. The assessment of Tier 2 projects

and plans is confined to a very high-level qualitative assessment given the lack of information available on the projects and plans.

Table 8.1: Tier 1 and Tier 2 Classification for 'Other' Projects and Plans

Tier 1	Under construction	**Decreasing level of detail likely to** 
	Permitted application(s) but not yet implemented	
	Submitted application(s) but not yet determined	
Tier 2	Identified in the relevant Development Plan and Strategies (and emerging Development Plans, with appropriate weight being given as they move closer to adoption) recognising that available information on any relevant proposals will be limited.	
	Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.	

1594. Inclusion or exclusion threshold criteria were applied to the list of 'other' projects and plans from the long list to determine whether they had any potential to give rise to in-combination effects with respect to the following:

- Whether the project has been completed, or the planning applications have been refused, withdrawn or expired (where not identified for the long list). If a project was identified as completed, it has been considered as part of the baseline as appropriate
- Whether there is a likelihood of temporal overlap (including overlap for construction and operational phases) between the Proposed Project and the 'other' projects and plans. Developments with construction (2028 to 2032) and operational (2033 onwards) phases overlapping with the Proposed Project were considered further. Developments with temporal scopes outside these periods were not shortlisted for the assessment
- Whether the scale and nature of the 'other' project or plan is likely to result in in-combination effects with the Proposed Project, taking account of the aspects of the environment for which the ZoI is relevant.

1595. Professional judgement was used in applying these threshold criteria. The shortlisting process is documented in Appendix L (Projects Considered for In-Combination Effects). The reasons for excluding any development from further consideration are recorded. Where 'other' projects and plans with the potential to give rise to in-combination effects with the Proposed Project were identified, sufficiently detailed information was compiled to inform the in-combination assessment. This included information such as: design and location; programme of construction, operation and decommissioning (where available); and AAs and/or environmental assessments that set out baseline data and effects arising from the 'other' projects and plans.

1596. The assessment has relied on readily available information from the planning and EIA portals, with regard to guidance and best practice. Professional judgement has been used where necessary to interpret the available information for use in the assessment of in-combination effects.

8.1.2 In-Combination Assessment of Plans

1597. Table 8.2 lists the national, regional, and county development plans within the ZoI of the Proposed Project, that were considered for in-combination effects.

Table 8.2: Plans Considered for the In-Combination Assessment

Plans
National Planning Frameworks
National Planning Framework (Project Ireland 2040) (Government of Ireland 2018a)
Draft First Revision to the National Planning Framework, 2024
National Development Plan 2021-2030 (Government of Ireland 2021)
National Water Resources Plan (and supporting Regional Water Resource Plans) (Irish Water 2021)
Irish Water Business Plan – Transforming Water Services in Ireland to 2021 (Irish Water 2015a)
National Adaptation Framework, 2024
Building on Recovery: Infrastructure and Capital Investment 2016-2021 (Department of Public Expenditure and Reform 2015)
IW Capital Investment Plans
Water Services Policy Statement 2024-2030 (DHLGH 2024c)
Water Services Strategic Plan – A Plan for the Future of Water Services (Irish Water 2015b)
Draft Water Services Strategic Plan 2050 (2024)
Water Action Plan 2024: A River Basin Management Plan for Ireland (DHLGH 2024a)
Assessment of Water and Waste Water Services for Enterprise (Forfás 2008)
National Catchment Flood Risk Assessment and Management Study (CFRAM) Programme
Regional Planning Frameworks
Regional Spatial and Economic Strategy for the Midland and Eastern Region (Eastern and Midland Regional Assembly 2019)
Regional Spatial and Economic Strategy for the Southern Region (Southern Regional Assembly 2020)
Regional Spatial and Economic Strategy for the North and West Region (Northern and Western Regional Assembly 2020)
County and Local Planning Frameworks
Tipperary County Development Plan, 2022-2028 (Tipperary County Council 2022)
Offaly County Development Plan 2021-2027 (Offaly County Council 2021)
Kildare County Development Plan, 2023-2029 (Kildare County Council 2022)
South Dublin County Development Plan 2022-2028 (South Dublin County Council 2022)
Clare County Development Plan 2023-2029 (Clare County Council 2023)
Limerick County Development Plan 2022-2028 (Limerick City and County Council 2022)
Laois County Development Plan, 2021-2027 (Laois County Council 2022)
Dublin City Development Plan, 2022-2028 (Dublin City Council 2022)
Fingal Development Plan, 2023-2029 (Fingal County Council 2023)
Dún Laoghaire-Rathdown County Development Plan 2022-2028 (Dún Laoghaire-Rathdown County Council 2022)
Relevant local area plans and masterplans, where relevant

1598. Considering the environmental protection policies included within the national and regional planning frameworks, the national and regional planning frameworks pose no identifiable risk of resulting in adverse effects on the integrity of any European sites in-combination with the Proposed Project.

1599. The CFRAM Programme will ultimately result in the development of catchment-based flood risk management plans. These may propose flood risk management measures which, through various potential impact pathways, could affect the conservation objectives supporting aquatic (or surface water dependent) qualifying interest habitats and species and special conservation interests of the Lower River Shannon SAC, Lisduff Fen SAC, Sharavogue Bog SAC, River Barrow and River Nore SAC, Lough Derg, North-east Shore SAC, Rye Water Valley/Carton SAC, Charleville Wood SAC, River Boyne and River Blackwater SAC, River Shannon Callows SAC, Lough Derg (Shannon) SPA, Dovegrove Callows SPA, River Little Brosna Callows SPA, River Shannon and River Fergus Estuaries SPA, River Boyne and

River Blackwater SPA, and the Middle Shannon Callows SPA in the Lower Shannon, Barrow, and Boyne catchments. This could be through pollution risks during construction works and/or changes to the functioning of the existing hydrological regime. However, there would be no in-combination effect for the following reasons:

- Any flood risk management measures or projects that might be recommended as part of the CFRAM Programme must comply with the statutory planning requirements and be in accordance with the objectives and policies of the relevant land use plans (e.g. Development Plans, Local Area Plans). This assessment has identified those land use plans that have the potential to act in-combination with the Proposed Project to affect European sites, given their spatial jurisdiction (see below discussions on the relevant land use plans)
- Considering the environmental protection policies included within those land use plans, and that alone the Proposed Project would not adversely affect the integrity of any European sites, the Proposed Project in-combination with the CFRAM Programme would not have an adverse effect on the integrity of any European sites.

1600. The Proposed Project lies partly within the functional area of the county and local level land use plans as listed in Table 8.2 and many of the objectives and policies therein, have the potential to act in-combination with the Proposed Project, through a variety of potential impact pathways, to affect European sites. The most likely of these is a reduction in water quality in the Lower Shannon, Barrow, and Boyne catchments affecting the conservation objectives supporting aquatic (or surface water dependent habitats and species in the Lower River Shannon SAC, Lisduff Fen SAC, Sharavogue Bog SAC, River Barrow and River Nore SAC, Lough Derg, North-east Shore SAC, Rye Water Valley/Carton SAC, Charleville Wood SAC, River Boyne and River Blackwater SAC, River Shannon Callows SAC, River Shannon and River Fergus Estuaries SPA, Lough Derg (Shannon) SPA, Dovegrove Callows SPA, River Little Brosna Callows SPA, River Boyne and River Blackwater SPA, and the Middle Shannon Callows SPA. However, there would be no in-combination effect for the following reasons:

- The county and local level land use plans contain objectives and policies to ensure the protection of European sites from any projects proposed within the plan area(s).
- Considering the protective environmental policies contained within the county and local level land use plans, and that alone the Proposed Project would not adversely affect the integrity of any European sites, these land use plans would not act in-combination with the Proposed Project to adversely affect the integrity of any European sites.

8.1.3 In-Combination Assessment of Projects

1601. Table 8.3 assesses the projects from Appendix L, that were identified as having the potential to have in-combination effects with the Proposed Project. No potential for impacts were identified for the following European sites, and therefore there is no potential for in-combination effects with ‘other’ projects listed in Appendix L; Slievefelim to Silvermines Mountains SPA, Slieve Bloom Mountains SPA, Slieve Aughty Mountains SPA, and Poulaphouca Reservoir SPA.

Table 8.3: In-combination Assessment of Projects

Authority (Application Reference) / Distance in Relation to the Proposed Project / Tier	Description and Address / Identification of In-Combination Effects	Relevant European Site(s)	Summary of the 'Other' Project's Potential Effects on the Relevant European Site(s)	Summary of the Proposed Project's Potential In-Combination Effects on the Relevant European Site(s)	Mitigation Measures	Conclusion
NA (existing development) Within Proposed Project (i.e. within the planning application boundary) Tier 1	Shannon Hydroelectric Scheme, including the Ardnacrusha Power Plant located near Ardnacrusha, County Clare and the Parteen Weir, located in Garrynatineel, County Tipperary.	• Lower River Shannon SAC	Currently there is a 'Borland-McDonald' fish lock at Ardnacrusha station and a 'pool-traverse fish pass' at Parteen regulating weir. These both accommodate the upstream and downstream movement of fish. Fish migration may be hindered or delayed due to the existence of hydro stations and their associated fish passes because the species of fish monitored and structural design of the fishways have strong implications for both attraction and passage performance (e.g. Noonan *et al*. 2011, Brunt *et al*. 2012). The upward and downward movement of fish are monitored by IFI using Vaki Riverwatcher™ automatic fish counters located at both Ardnacrusha Station and the Parteen Regulating weir fish passes. This data is included in the Annual Report of ESB sustainable Rivers (www.esb.ie). Fish descending the system may do so through several routes: • The turbines at Ardnacrusha generating station • The spillway at Parteen regulating weir • The two fish passes located at Ardnacrusha station and Parteen weir. The success of fish passage through Ardnacrusha Generating Station has been studied previously by ESB, the National University of Ireland Galway and the Marine Institute. These studies have found that survival rates are within the range of 92-88% for juvenile descending salmon. This was assessed in 2002, using Heisey Tags™ (88% survival), and previously the 2000-2010 releases of 10k batches of micro-tagged salmon (92% survival). For European eel, fieldwork research by the National University of Ireland Galway in 2009-2012 showed survival rates of 79% for downward migrating silver eel which had been tagged using acoustic tags. The movements and survival rates of fish moving through the Parteen spillway gates are currently unknown but will be studied utilising acoustic telemetry through 2026 to 2029 (ESB taking responsibility). Similarly, the passage of migratory fish within the Lower Shannon region (including both Parteen Weir and Ardnacrusha station), will be assessed for both salmon and eel in future years using acoustic telemetry and other telemetric techniques (ESB taking responsibility). Other migratory fish such as sea trout and lamprey may also be included in this program of work. The findings of these future planned studies will inform the design of adaptive management strategies aimed at minimising potential impacts on migratory fish species (ESB taking responsibility). The evaluation of flow management practices (ESB to install underwater cameras) at Parteen Weir presents opportunities to enhance ecological outcomes. It is possible to further support the development of a flow regime more closely aligned with natural	The Proposed Project would not alter the existing scenario and there would be no additional barrier effects to fish in the Lower River Shannon SAC as a result of the Proposed Project. Furthermore, the Proposed Project would not change the generator discharge rate at the Ardnacrusha Generating Station, however, the duration of discharges would be reduced by approximately 2% on average. This is because the flow rates through the power station are fixed by the generator characteristics and so, to bring about the reduction in volume required to accommodate the abstraction being proposed, a reduction in time operating must occur. This would result in lower volumes of flow through the Ardnacrusha Generating Station through an unchanged generator flow rate operating for a shorter period of time, with marginally longer periods of no flow through Ardnacrusha. Smolts migrating downstream would likely marginally benefit from this scenario as smolts are attracted to higher flows. During reduced periods of hydropower generation, they would therefore be encouraged to migrate downstream over Parteen Weir, instead of through the turbines at Ardnacrusha. Furthermore, within operating guidelines which seek to increase late spring water levels to the upper limit of the Normal Operating Band, the Proposed Project would not impede the ability to adjust appropriate hydropower flows, with increased flow to the Old River Shannon during periods of smolt migration (April). A sensitivity analysis to the proposed EFlow regime at Parteen Weir (CDM Smith 2021), in which the existing 10m^3/s compensation and fish pass flow is replaced by a varying compensation flow with the inclusion of freshets (increased flows during a flood event or a release of additional water) to assist migratory fish up the Old River Shannon and into Parteen Basin, was undertaken. This found that similar water level differences were simulated during the droughts when the proposed abstractions were included in the EFlow scenario as were predicted for the case for a constant compensation flow. However, this relies on the assumption that freshets would not be released during flood (i.e. when spilling) or drought conditions. The basis of this drought period assumption is that if the Eflow is an attempt to mimic the natural flow regime then artificially releasing standard freshets over this period would seem to be introducing a non-natural characteristic to the flow regime. In summary, the hydrological model found that the released flows to the Old River Shannon during periods of spill are virtually the same for the Proposed Project abstraction rate of 300Mld with either a compensation flow of 10m^3/s or Eflows. However, outside of flood and drought periods more water is released, together with flow variability, by the Eflows regime compared to the use of a uniform 10m^3/s compensation flow. Full details of the hydrological model Eflows sensitivity analysis are provided in the EIAR Appendix A9.1 Annex A (Hydrological Modelling Report). Reinstatement of more natural water regimes would involve partly storing all flood inflows and partly spilling to the Lower River Shannon in a naturally variable freshet time profile. Having due regard to the River Shannon	Design requirements and mitigation measures are included to ensure the retention and protection of qualifying interest habitats, to ensure that the structural integrity and functioning of the habitats within the SAC is not affected during the Construction Phase, to ensure the protection of the receiving environments, to prevent the introduction/spread of plant INNS to the SAC and to ensure that the Proposed Project does not present a barrier to the movement of the salmon and lamprey populations of the SAC. Refer to Section 7.1.4 and Table 7.5 for how these mitigation measures relate back to the qualifying interests and conservation objectives of the Lower River Shannon SAC. The results from the hydrological and water quality models demonstrate there would be no significant effect on the existing hydrological regime either upstream or downstream of the RWI&PS site at Parteen Basin. The proposed abstraction at Parteen Basin would always be from within the Normal Operating Band and within the upper and lower water levels that ESB applies to Parteen Basin, unless flood conditions take water levels outside the Normal Operating Band Limits (see Section 3.5.11 and Section 4.1.1). It does not subtract from 'Shannon inflow' from Portumna, or from the upstream or downstream tributaries. It does not diminish water flowing through Lough Derg itself. It also does not diminish the minimum compensation water flow rate at Parteen Weir (10m^3/s). As part of an overall agreement with ESB, water will be diverted to the Proposed Project abstraction from the flow that would otherwise have been used for electricity generation on a continuous year-round basis. At a practical level, this will mean that ESB, in keeping the water level within the Normal Operating Band on Lough Derg and within the upper and lower water level on Parteen Basin, will take account of, and respond to, the volume of water abstracted for the Proposed Project, alongside other relevant considerations such as, maintaining statutory compensation flow of 10m^3/s down the old Shannon channel, predicted rainfall, the demand for power and operating practices. ESB will maintain the water levels within the Normal Operating Band on Lough Derg and within the upper and lower water levels on Parteen Basin, as it does currently. During drought conditions, if hydropower generation had ceased, again there would be no changes to the statutory compensation flows to the Old River Shannon as both the compensation flow and the water supply abstraction would continue to take from storage in Parteen Basin. Given the design requirements and mitigation measures detailed in Section 7.1.4, none of the identified potential impact sources would adversely affect (either directly or indirectly) the integrity of the Lower River Shannon SAC.	Given that the Proposed Project alone would not adversely affect the integrity of the Lower River Shannon SAC, and that there would be no additional barrier effects to fish migration or mortality of fish with the proposed mitigation measures in place, or any change to the generator discharge rate at the Ardnacrusha Generating Station, there would be no possibility for any significant in-combination effects with the Shannon Hydroelectric Scheme.

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			hydrological variability which would contribute to the long-term protection and enhancement of aquatic habitats and fish populations within the Old River Shannon (ESB taking responsibility). The hydrological regime downstream of Parteen Weir is primarily governed by the statutory compensation flow, which provides a consistent discharge of 10m³/s to the Old River Shannon. This flow regime ensures the maintenance of a base flow. Additional water is released from Parteen Weir on an intermittent basis during periods of elevated inflow, contributing to occasional variability in river discharge. While these releases introduce some hydrological variability which is positive towards habitat diversity and resilience, the overall regime remains largely managed and regulated and natural seasonal variations in flow are modified to some extent by operational practices.	statutory compensation flow obligations, ESB's current practice is that late spring water level is kept near the top of the Normal Operating Band. At winter flood times, and when autumn recovery has started, greater sharing of inflows between storage and the Old River Shannon reduces water available for use in hydropower, reducing revenue to ESB. The Proposed Project would be abstracting abstracting up to a maximum of 300Mld or 3.47m³/s and while there may be technicalities for ESB in adjusting gates to provide flow variability, the Proposed Project would not impede a flow-sharing decision between hydropower and statutory compensation flow at appropriate times of the year and is not an impediment to any Parteen Weir gate adjustments to implement it.		
Tipperary County Council (245) Tier 1	Arrabawn Co-Operative Society Limited. A solar PV panel array consisting of up to 10,000 no. solar PV panels (c.27,010m2) on ground mounted steel frames on a c.6.33 hectare site, external transformer, power inverter units, underground cable ducts, perimeter security fence, CCTV masts, solar lighting and all associated works Knockanpierce, Nenagh, Co. Tipperary.	• Lower River Shannon SAC • Lough Derg (Shannon) SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Lough Derg (Shannon) SPA and the Lower River Shannon SAC via the Nenagh River. Therefore, construction works located in the same catchment have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4) • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4) • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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					All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Tipperary County Council (2460074) Tier 1	Renewable Energy Systems (RES) Ltd A 10-year planning permission to construct and complete a solar PV Energy Development with a total site area of c. 88.5 hectares comprising of solar PV ground mounted on support structures, inverter substations, 38kV substation, temporary construction compounds, electrical cabling and ducting, CCTV and other ancillary infrastructure. The solar farm would be operational for 40 years. Townlands of Kerane Fawnlough and Ballynaclough, Nenagh, Co. Tipperary.	• Lough Derg, North-east Shore SAC • Lough Derg (Shannon) SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Lough Derg, North-east Shore SAC and the Lough Derg (Shannon) SPA. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent negative effects on breeding birds during the nesting season, as detailed in Section 7.12.4. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Tipperary County Council (2560151) Tier 1	Uisce Éireann Ground and roof mounted photovoltaic solar panels with a maximum actual square metreage of 175 m2 distributed over a grass area and flat roof on the treatment plant in combination with associated ancillary works. Water Treatment Works Newross, Newport, Co. Tipperary.	• Lower River Shannon SAC • Slievefelim to Silvermines Mountains SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Lower River Shannon SAC and Slievefelim to Silvermines Mountains SPA. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a

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				accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Tipperary County Council (2461086) Tier 1	Uisce Éireann Upgrade the existing Nenagh Wastewater Treatment Plant from its current design Population Equivalent (PE) of 12,000 to a PE plant of 22,000. The existing Wastewater Treatment Plant, Bulfin Road, Nenagh in the townland of Nenagh North.	• Lower River Shannon SAC • Lough Derg (Shannon) SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Lower River Shannon SAC and the Lough Derg (Shannon) SPA. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result

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				introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4) • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4) • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	in adverse effects on the integrity of European sites.
Offaly County Council (20238) Tier 1	Rhode Energy Storage LTD An energy storage facility on a 2.7-hectare site. The development will comprise: (i) an open area battery energy storage system (BESS) compound, 16 no. Medium voltage power station (MVPS) enclosures, (ii) synchronous condenser compound, controls building, associated bunded transformers and electrical plant, (iii) electrical substation containing customer building, Eirgrid building, and electrical plant and bunded transformer which will electrically connect the development to the existing derryion 110kv substation located on lands adjoining the site to the south, (iv) control building and (v) all ancillary development. Coolcor And Clonin, Rhode, Co. Offaly.	• River Boyne and River Blackwater SAC • River Boyne and River Blackwater SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the River Boyne and River Blackwater SAC and the River Boyne and River Blackwater SPA via the Yellow River. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4) • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning).	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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				sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Offaly County Council (19325) Tier 1	Banagher Chilling Limited Single storey extension to existing abattoir of 1061 square meters. In addition, the construction of a food processing factory of 4925 square meters and all associated siteworks Boheradurrow and Meenwaun, Banagher, Co. Offaly R42 HX24.	• River Shannon Callows SAC • Middle Shannon Callows SPA • River Little Brosna Callows SPA • Dovegrove Callows SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the River Shannon Callows SAC, Middle Shannon Callows SPA, River Little Brosna Callows SPA and Dovegrove Callows SPA. Therefore, construction works located in the same catchment have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality effects on otter due to collisions with construction traffic/machinery or from construction materials accidentally falling into a water body. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundaries. **Operation** • Potential for in-combination effects during operation through an accidental spillage of chemicals or as a result of excavations required to repair or replace sections of pipeline. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. • Mitigation to prevent negative effects on breeding birds during the nesting season, as detailed in Section 7.12.4. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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Offaly County Council (2560014) Tier 1	Bord na Móna Energy Ltd Recreational shared cycle and walkway located on Bord Na Móna lands. This will include the repurposing of 16,919 meters of existing former rail bed and 8,960 meters along existing bog headlands / former high fields. The proposed shared cycle and walkway will connect into the existing Grand Canal Greenway, The Offaly Way, and the Lough Boora Discovery Park. Bord Na Móna lands within the townlands of Cloncraff or Bloomhill Clonascra Ballyduff Clonaderg Doon Demesne Lackagh Beg Lackagh More, Cormore and Corbeg Corbane Ballydaly Kilcolgan Beg Turraun Leabeg Leamore Oughter Derrymore Bunakeeran, Lumcloon, Co. Offaly.	• Middle Shannon Callows SPA • River Shannon Callows SAC	An NIS was completed for this 'other' project, which details that this project is located partially within the Middle Shannon Callows SPA, and is hydrologically connected to the River Shannon Callows SAC via onsite drainage. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality effects on otter due to collisions with construction traffic/machinery or from construction materials accidentally falling into a water body. **Operation** • Potential for in-combination effects during operation through an accidental spillage of chemicals or as a result of excavations required to repair or replace sections of pipeline. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). • All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Offaly County Council (20621) Tier 1	Bord Na Mona Energy Ltd. The continued use of the previously permitted ash repository (An Coimisiún Pleanála pl 19.216998 / Offaly County Council 05/1267) for deposition of up to 20,000 tonnes of peat ash and biomass ash during 2023. No new infrastructure is proposed as part of this application. The Existing Clonbullogue Ash Repository in the Townland of Cloncreen, Clonbullogue, Co. Offaly.	• River Barrow and River Nore SAC	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the River Barrow and River Nore SAC via the River Figile. Therefore, construction works located in the same catchment have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on

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				Operation • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	the integrity of European sites.
Offaly County Council (2560115) Tier 1	Bord Na Móna The development of a recreational shared cycle and walkway located on Bord Na Móna lands. This Planning Application is accompanied by a Natura Impact Statement (NIS) Bord Na Móna lands within the townlands of, Knockballyboy, Clonad, Rathfeston, Gorteenkeel, Island, Clonarrow or Riverlyons, Drumcaw or Mountlucas, Esker Beg, Killeen, Ballyhugh, Mullalough or Cavemount, Coole, Toberdaly, Newtown, Ballycon, Esker More, Colgagh, and Clongarret in County Offaly.	• Middle Shannon Callows SAC • River Shannon Callows SAC • River Barrow and River Nore SAC	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Middle Shannon Callows SPA, River Shannon Callows SAC and the River Barrow and River Nore SAC. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP. • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning).	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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					All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Offaly County Council (2560189) Tier 1	Clonarrow Windfarm Limited A 10-year planning permission for the erection of 4 wind turbines and 35 year operational life from the date of commissioning of the entire wind farm is being sought. The planning application will be accompanied by an Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS). Clonarrow or Riverlyons, and Killoneen Co. Offaly.	• River Barrow and River Nore SAC	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the River Barrow and River Nore SAC via the River Daingean. Therefore, construction works located in the same catchment have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP. • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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Offaly County Council (21134) Tier 1	Cadamstown Group Water Scheme Company Clg Construction of a 280 cubic meter water storage reservoir and all associated site works. Sheskin, Cadamstown, Birr, Co. Offaly.	• Slieve Bloom Mountains SPA	An NIS was completed for this 'other' project, which details that this project is located adjacent to the Slieve Bloom Mountains SPA. Therefore, construction works have the potential to act in-combination with the Proposed Project to result in disturbance and habitat loss impacts on hen harrier associated with the Slieve Bloom Mountains SPA.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for temporary loss of low suitability habitat for foraging hen harrier • Potential for temporary localised disturbance/displacement effects on foraging hen harrier in areas of low suitability habitats The habitats affected by the Proposed Project are generally of low suitability for foraging hen harrier, the construction works will be temporary in nature and the area of habitats that would be affected is small in comparison to hen harriers' foraging range. Therefore, the assessment for the Proposed Project has concluded that there is no potential for impacts associated with the Proposed Project to result in any significant adverse effects on the breeding hen harrier population of the Slieve Bloom Mountains SPA.	The NIS for the Proposed Project concludes that there is no potential for impacts associated with the Construction or Operational Phase of the Proposed Project that could adversely affect the integrity of the Slieve Bloom Mountains SPA. Therefore, no mitigation measures are required. The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project, and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of the 'other' project's NIS and given that there is no potential for the Proposed Project to result in direct or indirect impacts that could adversely affect the integrity of this European site. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Offaly County Council (1925) Tier 1	Derryarkin Sand AND Gravel DAC An 87.6 hectare extension to the south-west, south and south-east of its existing sand and gravel pit; upgrading of the access road; new wheelwash facility; provision of mobile site office, mobile staff welfare unit and refuelling pavement slab; restoration of the proposed extension lands to naturally regenerated wildlife habitat, water ponds and potential long-term amenity use. Derrygreenagh, Knockdrin, Garr and Carrick Townlands, Rhode, Co. Offaly.	• River Boyne and River Blackwater SAC • River Boyne and River Blackwater SPA	An AA Screening report was prepared for this 'other' project. This report noted that there is hydrological connectivity to the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA This AA Screening concluded, based on the best scientific knowledge available, that no significant effects whether arising from the project itself or in-combination with any other plan or project, are likely to occur to any European sites	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4) • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The AA Screening for the 'other' project objectively concluded that the project would not result in any likely significant effects (either directly or indirectly) on any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of this development's AA Screening, and that following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Offaly County Council (2560087) Tier 1	Eirgrid Uprate of the existing 110 kV Overhead Line (OHL) between the existing Cushaling 110 kV substation in the townland of Ballykilleen, Co. Offaly and the	• River Barrow and River Nore SAC	An NIS was completed for this 'other' project, which details that this project oversails the River Barrow and River Nore SAC, and there is hydrological and hydrogeological connectivity. Therefore, construction works located in the	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction**	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section

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	existing Portlaoise 110 kV substation in the townlands of Clonminam and Kylekiproe, Co. Laois. The Proposed Development works across the functional area of Co.Offaly will comprise replacement of the existing overhead line circuit conductor, replacement of the existing earthwire with new earthwire between structures 1 and 8; replacement of steel members at 3 no. towers, full tower painting required at 3 no. locations, replacement of wooden poles only at 7 no. locations, replacement of wooden poles and crossarm at 2 no. locations, replacement of crossarm only at 3 no. locations. Ballykilleen (Edenderry Rural Electoral Division) Kilcumber Cloncant Ballydermot Clonmel Clonbrown Clonroosk Little Clonroosk Big Coolygagan Clonbrock Upper Kilcloncorkry Kilnantoge Lower Kilnantoge Upper and Shean., Co. Offaly.		same catchment have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	• Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP. • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Offaly County Council (2460338) Tier 1	ENGIE Developments Ireland Limited Development of a c. 14MW solar photovoltaic (PV) farm at this 29.75ha site. The application seeks a 10-year permission with an operational lifetime of 35 years. The development will consist of approximately 38,000 panels on ground mounted metal frames,1 no. 38kV substation, 3 no. transformer units, Underground cabling and ducting. Townland of Clara, near Clara, Co. Offaly.	• River Shannon Callows SAC • Middle Shannon Callows SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the River Shannon Callows SAC and the Middle Shannon Callows SPA via the Brosna River. Therefore, construction works located in the same catchment have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality effects on otter due to collisions with construction traffic/machinery or from construction materials accidentally falling into a water body. **Operation**	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation**	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

Authority (Application Reference) / Distance in Relation to the Proposed Project / Tier	Description and Address / Identification of In-Combination Effects	Relevant European Site(s)	Summary of the 'Other' Project's Potential Effects on the Relevant European Site(s)	Summary of the Proposed Project's Potential In-Combination Effects on the Relevant European Site(s)	Mitigation Measures	Conclusion
				• Potential for in-combination effects during operation through an accidental spillage of chemicals or as a result of excavations required to repair or replace sections of pipeline. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). • All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Offaly County Council (20593) Tier 1	Galway Herb Farm Limited T/A Real Leaf Farm The construction of a greenhouse and ancillary buildings. Ballycon, Daingean, Co. Offaly, R35P7X6.	• River Barrow and River Nore SAC	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the River Barrow and River Nore SAC via an onsite drainage ditch and the River Figile. Therefore, construction works located in the same catchment have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP. • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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					predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Offaly County Council (21247) Tier 1	Kilmurray Pre-Cast Concrete LTDA 23 year permission for a 44.0 hectare extension to an existing authorised sand and gravel pit Derryarkin & Bunsallagh Townlands, Rhode, Co. Offaly.	• River Boyne and River Blackwater SAC • River Boyne and River Blackwater SPA	An NIS was completed for this 'other' project, which details that this project is within the River Boyne and River Blackwater SAC and the River Boyne and River Blackwater SPA. Therefore, construction works located in the same catchment have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4) • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Offaly County Council (20237) Tier 1	Newleaf Energy LTD Development of a combined heat and power generating biomass gasification plant with integrated carbon capture and utilisation technology to provide renewable energy and electrical grid support services on a 2.45-hectare site. Coolcor, Rhode, Co Offaly.	• River Boyne and River Blackwater SAC • River Boyne and River Blackwater SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the River Boyne and River Blackwater SAC and the River Boyne and River Blackwater SPA via the Yellow River. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4)	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore,

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				introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Offaly County Council (2198) Tier 1	Renewable Energy Systems Limited A period of 5 years to construct and complete a solar pv energy development with a total site area of 60.53 hectares, to include a single storey electrical substation building, inverter substations, modules, solar pv ground mounted on support structures, a temporary construction compound, internal access tracks, security fencing, electrical cabling and ducting, cctv and other ancillary infrastructure. Ballyteige Little, Ballyteige Big and Colehill, Tullamore, Co. Offaly.	• Charleville Wood SAC	An AA Screening was completed for this 'other' project, which details that this project is hydrologically connected to the Charleville Wood SAC. This AA Screening concluded, based on the best scientific knowledge available, that no significant effects whether arising from the project itself or in-combination with any other plan or project, are likely to occur to any European sites	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The AA Screening for the 'other' project objectively concluded that the project would not result in any likely significant effects (either directly or indirectly) on any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of this development's AA Screening, and that following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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Offaly County Council (21488) Tier 1	OBM Solar Limited A 10 year permission for the construction of an extension to the permitted solar pv and battery storage development permitted under planning permission reference: 20/494. The extension will comprise additional solar panels on ground-mounted frames, 6 single storey electrical inverter/ transformer units. Greenhills, Rhode, Co. Offaly.	• River Boyne and River Blackwater SAC • River Boyne and River Blackwater SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the River Boyne and River Blackwater SAC and the River Boyne and River Blackwater SPA. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4) • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Offaly County Council (20494) Tier 1	OBM Solar LTD A 10-year permission for the construction of a solar pv development on a c.132 ha site consisting of solar panels on ground-mounted frames, 27 no. Single storey electrical inverter/ transformer units, an enclosed battery energy storage system compound on a c.0.385 ha located within the solar pv development site consisting of 18 no. Battery storage units and all associated ancillary development works. Srah, Greenhills And Wood, Rhode, Co. Offaly.	• River Boyne and River Blackwater SAC • River Boyne and River Blackwater SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the River Boyne and River Blackwater SAC and the River Boyne and River Blackwater SPA. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4) • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning).	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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				sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Offaly County Council (218) Tier 1	Offaly Solar Energy As Limited A 10 year planning permission for the construction of, and a 40 year operation and subsequent decommissioning of, a development consisting of a 52.75 hectare solar farm and battery energy storage system and 9.32 kilometre underground electricity grid connection (0.95 hectares). Townlands Of Derries, Lackan, Kilmurry, Derrygrogan Little, Derrygrogan Big, Wood Of O, Corndarragh, Derrynagall Or Ballydaly, Ardan And Puttaghan, Co. Offaly.	• River Shannon Callows SAC • Middle Shannon Callows SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the River Shannon Callows SAC and the Middle Shannon Callows SPA. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality effects on otter due to collisions with construction traffic/machinery or from construction materials accidentally falling into a water body. **Operation** • Potential for in-combination effects during operation through an accidental spillage of chemicals or as a result of excavations required to repair or replace sections of pipeline. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). • All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

Authority (Application Reference) / Distance in Relation to the Proposed Project / Tier	Description and Address / Identification of In-Combination Effects	Relevant European Site(s)	Summary of the 'Other' Project's Potential Effects on the Relevant European Site(s)	Summary of the Proposed Project's Potential In-Combination Effects on the Relevant European Site(s)	Mitigation Measures	Conclusion
Offaly County Council (20476) Tier 1	Summit Solar LTD A 10 year permission for development which consists of the construction of a solar pv development comprising of ca. 105,000 no. Photovoltaic panels laid out in arrays, the construction of 38kv substation, a transformer unit and associated bund, along with ancillary development. Rathmount, Mullanafawnia, And Russellspenn, Co. Offaly.	• River Shannon Callows SAC • Middle Shannon Callows SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the River Shannon Callows SAC and the Middle Shannon Callows SPA via the Rapemills Stream. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality effects on otter due to collisions with construction traffic/machinery or from construction materials accidentally falling into a water body. **Operation** • Potential for in-combination effects during operation through an accidental spillage of chemicals or as a result of excavations required to repair or replace sections of pipeline. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). • All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Offaly County Council (21622) Tier 1	Summit Solar Ltd A 10 year permission for the construction of a solar pv development comprising of ca.55,000 no. Photovoltaic panels laid out in arrays, along with ancillary development. Broughal and Drinagh, Co Offaly.	• River Shannon Callows SAC • Middle Shannon Callows SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the River Shannon Callows SAC and the Middle Shannon Callows SPA via the Silver River. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality effects on otter due to collisions with construction traffic/machinery or from construction materials accidentally falling into a water body.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation**	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on

Authority (Application Reference) / Distance in Relation to the Proposed Project / Tier	Description and Address / Identification of In-Combination Effects	Relevant European Site(s)	Summary of the 'Other' Project's Potential Effects on the Relevant European Site(s)	Summary of the Proposed Project's Potential In-Combination Effects on the Relevant European Site(s)	Mitigation Measures	Conclusion
				Operation • Potential for in-combination effects during operation through an accidental spillage of chemicals or as a result of excavations required to repair or replace sections of pipeline. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). • All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	the integrity of European sites.
Offaly County Council (21598) 0m to 20m Tier 1	A period of 10 years to construct and complete a solar PV development with a total site area of circa 117.47 hectares, to include PV panels mounted on metal frames, new access tracks, underground cabling, perimeter fencing with CCTV cameras, 22 no. MV power stations, temporary construction compounds and all ancillary grid infrastructure and associated works. The solar farm would be operational for 40 years. Development is Kilcush Solar Farm (adjacent to Cushaling Wind Farm). South of Edenderry (near Edenderry Power Station), adjacent to Proposed Project and adjacent to the River Figile which is crossed by the Proposed Project. This development has a downstream pathway to the River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.	• River Barrow and River Nore SAC	An AA Screening Report was prepared for this 'other' project. This report noted that the project is hydrologically connected to the River Barrow and River Nore SAC via the Figile River, at a hydrological distance of c. 20km.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP. • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). Th AA Screening produced for the 'other project' concluded, that while connectivity exists between the project and the River Barrow and River Nore SAC, providing a	Given the conclusion of this development's AA Screening, and that following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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					pathway for potential impacts, the main qualifying features of these designated sites have been outlined and assessed in full. No significant effects are predicted for the River Barrow and River Nore SAC. The project will not affect the integrity of any European sites. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Offaly County Council (2138) Tier 1	Ummeras Wind Farm Limited Road / junction accommodation works to facilitate turbine deliveries associated with a proposed wind farm development in co. Kildare. A concurrent planning application is being lodged to Kildare county council in relation to a 10 year planning permission for a wind farm development which consists of 5 no. Wind turbines and associated infrastructure. Bracknagh, Ardra, Moanvane, Garrymona and Ballychristal, Co. Offaly.	• River Barrow and River Nore SAC	An NIS was completed for this 'other' project, which details that this project has hydrological connectivity to the River Barrow and River Nore SAC via the River Figile. Therefore, construction works have the potential to act in-combination with the 'other' project to result in significant effects on European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP. • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Offaly County Council (16177) 0m to 20m Tier 1	Infilling of lands with material consisting of clean, uncontaminated soil and stones and for the crushing of concrete on a sporadic basis (which is not for infilling on the site) prior to its removal for reuse. Permission is also sought for one temporary	• River Barrow and River Nore SAC	An NIS was prepared for this 'other' project. This report noted that the project is hydrologically connected to the River Barrow and River Nore SAC via the Figile River.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect

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	onsite portable toilet and one temporary portacabin which will serve as an office for the duration of the infilling process. Development is located directly adjacent to the Proposed Project and overlaps in one area (TWD – 3500). It is adjacent to the Figile_030 watercourse. Downstream pathway to River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.			• Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP. • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Offaly County Council (20331) 20m to 250m Tier 1	Croghan Biomass Facility, located within the townlands of Esker Beg and Drumcaw or Mountlucas, Co. Offaly at grid reference 651434, 727855 for the storage and seasoning of biomass logs followed by chipping of the seasoned logs on a site area of 5.6ha. Development located adjacent to the Proposed Project. Existing BnM facility. Adjacent to the Daingean_030 watercourse which flows downstream to the River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.	• River Barrow and River Nore SAC	An AA Screening Report was completed for this 'other' project, which details that the project is hydrologically connected to the River Barrow and River Nore SAC, at a downstream distance of c. 30km, via the Figile River. The potential for likely significant hydrological effects arising from the project has been screened out due to distance.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP. • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4).	Given the conclusion of this development's AA Screening, and that following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

Authority (Application Reference) / Distance in Relation to the Proposed Project / Tier	Description and Address / Identification of In-Combination Effects	Relevant European Site(s)	Summary of the 'Other' Project's Potential Effects on the Relevant European Site(s)	Summary of the Proposed Project's Potential In-Combination Effects on the Relevant European Site(s)	Mitigation Measures	Conclusion
				sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	**Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The AA Screening Report prepared for the 'other project' concludes that the project has been examined in relation to the relevant European sites within the ZoI and has analysed the potential significant effects on these European sites. It was concluded that the project, whether individually or in-combination with other plans and projects, is not likely to have a significant effect upon any European sites. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
An Coimisiún Pleanála (309686) 911m Tier 1	Application for a ten-year permission for a 110kV Air Insulated Switchgear (AIS) Loop Substation with 400m long overhead line grid connection and all associated site works. In the townlands of Ballykilleen, Cloncreen and Ballinowlart North, Co. Offaly. South of Edenderry (near Edenderry power station), downstream of the Proposed Project and adjacent to the River Figile which is crossed by the Proposed Project. This development leads downstream to the River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.	• River Barrow and River Nore SAC	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the River Barrow and River Nore SAC via the Figile River (c. 70m from the project). Therefore, construction works located in the same catchment have the potential to act in-combination with the 'other' project to result in a decline in water quality within the SAC.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP. • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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					No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Offaly County Council (20218) 500m to 600m Tier 1	Laying an underground electricity cable of up to 110kV and associated ducting and ancillary development primarily within the public road to facilitate the connection of the permitted Moanvane Wind Farm within the townlands of Rathfeston, Ballykean, Ballyduff, Raheenbeg, Kilcooney, Ballintogher, Gorteenkeel and Ballynakill to the national electricity grid via the existing Mountlucas 110kV substation in the townland of Ballynakill, Co. Offaly. Development is located south of the Proposed Project. Potential downstream pathway to River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.	• River Barrow and River Nore SAC	An NIS was completed for this 'other' project which details that this project is hydrologically connected to the River Barrow and River Nore SAC at a downstream distance of 18km. Therefore, there is potential for 'other' projects to act in-combination with this project to result in significant effects on the River Barrow and River Nore SAC as a result of water quality impacts and spread of invasive flora species.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP. • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Offaly County Council (2152) 600m to 1km Tier 1	A modular battery energy storage system (BESS) facility within the footprint of a previously consented construction compound. Planning permission is sought for a period of 10 years. Development is part of the Cloncreen Wind Farm (southwest of Cushaling). Downstream connection to the	• River Barrow and River Nore SAC	An NIS was completed for this 'other' project which details that this project is hydrologically connected to the River Barrow and River Nore SAC at a downstream distance of 40km via the River Figile. Therefore, there is potential for 'other' projects to act in-combination with this project to result in significant effects on the River Barrow and River Nore SAC as a result of water quality impacts.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1).	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a

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	River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.			• Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP. • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Kildare County Council (2461180) Tier 1	Cadamstown Solar Limited For a period of 10 years to construct and complete a solar PV Energy Development with a total site area of 173.3 hectares. The solar farm would be operational for 40 years. Townlands of Cadamstown, Ballina Clonuff and Garrisker, Co. Kildare.	• River Boyne and River Blackwater SAC • River Boyne and River Blackwater SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the River Boyne and River Blackwater SAC and the River Boyne and River Blackwater SPA. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4) • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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				INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Kildare County Council (2560291) Tier 1	Cadamstown Solar Ltd Solar PV energy development with a total site area of 45.9 hectares, comprising of the construction of PV panels mounted on metal frames, transformer stations, GRP unit, internal access tracks, perimeter fencing with CCTV cameras and access gates, electrical cabling and ducting, temporary construction compound, landscaping and all ancillary infrastructure and associated works. The solar farm would be operational for 35 years. The export capacity to grid is estimated to be c. 35MW MEC. Townland of Kilglass, Co. Kildare.	• River Boyne and River Blackwater SAC • River Boyne and River Blackwater SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the River Boyne and River Blackwater SAC and the River Boyne and River Blackwater SPA. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4) • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Kildare County Council (2560003) Tier 1	Dunform Properties Limited Construction of 133 no. residential dwellings, consisting of 20 no. 1-bedroom maisonettes, 4 no. 1-bedroom duplex units, 2 no. 2-bedroom duplex units, 6 no. 3-bedroom duplex units, 5 no. 2 bedroom	• Rye Water Valley/Carton SAC	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Rye Water Valley/Carton SAC. Therefore, construction works located in the same catchment have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect

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	bungalows, 37 no. 2-bedroom houses, 57 no. 3-bedroom houses, and 2 no. 4-bedroom houses. 3.43 ha site at Branganstown East Lands, Kilcock, Co. Kildare.			• Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Kildare County Council (2460494) Tier 1	Eirgrid Plc. Construction of a new 220 kV Gas Insulated Switchgear (GIS) building;construction of a new 110kV GIS building; construction of 4 no. 220/110kV power transformers to include connections to the new GIS buildings; 2 no. 220kV and 1 no. 110kV line/cable interface towers and associated removal of 3 no. existing end masts and overhead line and cable works; 3 no. lightning masts (height 22m); cable connections to the 220kV GIS and 110kV buildings; new 4.5m wide internal access road and 10 no. new permanent car parking spaces;and cable connection for the existing Derryiron-Maynooth 110kV overhead line. Planning permission is sought for a period of 10 years. Maynooth 220kV Substation, Taghadoe and Windgates, Co. Kildare.	• Rye Water Valley/Carton SAC	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Rye Water Valley/Carton SAC. Therefore, construction works located in the same catchment have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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					No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Kildare County Council (2560302) Tier 1	Eirgrid Plc. Works associated with the proposed uprate of the existing 110 kV Overhead Line (OHL) between the existing Cushaling 110 kV substation in the townland of Ballykilleen, Co. Offaly and the existing Portlaoise 110 kV substation in the townlands of Clonminam and Kylekiproe, Co. Laois. The Proposed Development works across the functional area of Co. Kildare will comprise replacement of the existing overhead line circuit conductor with a new higher capacity conductor including installation of a new fibre communication connection, replacement of 2 no. steel towers, replacement of steel members at 1 no. tower, replacement of wooden poles only at 8 no. locations, replacement of wooden poles and crossarm at 3 no. locations, replacement of crossarm at 4 no. locations, replacement of hardware and fittings. Coolelan Kiltaghan North Kiltaghan South Clonmoyle West Ummeras More Mountrice Mullaghroe Upper Mullaghroe Lower Coolatogher Coolsickin or Quinsborough and Coolnafearagh, Co. Kildare.	• River Barrow and River Nore SAC	An NIS was completed for this 'other' project, which details that this project oversails the River Barrow and River Nore SAC, and there is hydrological and hydrogeological connectivity. Therefore, construction works located in the same catchment have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP. • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
An Coimisiún Pleanála (321383) Tier 1	Kildare County Council Proposed rehabilitation works on Pass Bridge. Passlands, Monasterevin, Co. Kildare.	• River Barrow and River Nore SAC	An NIS was completed for this 'other' project, which details that this project is within the River Barrow and River Nore SAC. Therefore, construction works located in the same catchment have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4).	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore,

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				introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP. • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Kildare County Council (24357) Tier 1	Oscar Dawn Limited Solar panel array consisting of up to c.94kWp (c.414m2) of solar panels fixed to metal frames and anchored to the ground, cable ducts and all associated works, as revised by Significant Further Information consisting of a Flood Risk Assessment and an Appropriate Assessment with Natura Impact Statement The Hazel Hotel, Skirteen, Monasterevin.	• River Barrow and River Nore SAC	An NIS was completed for this 'other' project, which details that this project is in direct proximity to the River Barrow and River Nore SAC. Therefore, construction works have the potential to act in-combination with the 'other' project to result in significant effects on European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP. • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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				These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	(EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Kildare County Council (23837) 0m to 20m Tier 1	The construction of a photovoltaic solar farm comprising of 54 no. table solar panel arrays erected on ground mounted galvanised steel frames/support structures located in the southeast corner of the existing mushroom, compost and farm facility. Development located directly adjacent to Proposed Project (Monaghan Mushrooms south of Carbury, County Kildare. Hydrological pathway to the River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.	• River Barrow and River Nore SAC • Rye Water Valley/Carton SAC	An AA Screening Report and Conclusion Statement was prepared by Kildare County Council in respect of this project. This statement noted that having regard to the proximity of the nearest SAC sites, and the scale, nature and extent of the project, it is not considered a potential exists for significant effects on European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP. • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of this development's AA Screening, and that following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Kildare County Council (201581) 0m to 20m	Construction of a single storey mono-pitch roof staff training room (67.6 sqm) directly accessible from the wider Monaghan Mushrooms facility	• River Barrow and River Nore SAC	An AA Screening Report was not produced for this development. Given the small nature of the project, and the fact that it is located c. 20km from the River Barrow and River Nore SAC as the crow flies, and further in relation to	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction**	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of	No potential for in-combination effects due to scale and nature of the 'other'

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Tier 1	campus; and all ancillary site works necessary to facilitate the development. Development located directly adjacent to the Proposed Project (Monaghan Mushrooms south of Carbury, County Kildare). Hydrological pathway to the River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.		hydrological distance, it is considered unlikely that any impacts associated with this project would act in-combination with the Proposed Project.	• Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP. • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	project, and distance from European sites.
An Coimisiún Pleanála (316372) Within Proposed Project (i.e. within the planning application boundary) Tier 1	Kildare-Meath Grid Upgrade' - Proposed development of a 400 kV underground cable between Dunstown 400 kV substation and Woodland 400 kV substation. In the townlands of Dunstown, Co. Kildare and Woodland, Co. Meath. This development crosses the Proposed Project at R407 near the townlands Baltracey and Ballyloughan, County Kildare (road to Kilcock). It crosses watercourses that lead downstream to the Rye Water Valley/Carton SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.	• Rye Water Valley/Carton SAC • River Boyne and River Blackwater SAC	An NIS was completed for this 'other' project, which details that the project is hydrologically connected to the Rye Water Valley/Carton SAC at a downstream distance of 8.15km. There is also connectivity between the project and the River Boyne and Blackwater SAC for otter. Therefore, there is potential for 'other' projects to act in-combination with this project to result in significant effects on surface water quality, habitat loss/fragmentation and disturbance effects.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor).	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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				These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Kildare County Council (21455) 20m to 250m Tier 1	Bridge over the River Liffey to facilitate farming. The bridge will consist of 3 spans of 30.1m, 8.3m and 28.4m for a total length of 66.8m, a deck width of 2.75m and it will be supported by 4 no. abutment walls. It will contain railings on either side which will measure 2.26m high and have a structural depth of 2.5m. All associated site works including gravel access ramps. Development crosses the Liffey_140 watercourse approximately 900m downstream of where the Proposed Project crosses this watercourse. Instream works proposed and downstream pathway to the Rye Water Valley/Carton SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.	• Rye Water Valley/Carton SAC	An AA Screening Report was prepared for this 'other' project. This report noted that the project is hydrologically connected to the Rye Water Vally/Carton SAC via the River Liffey. However, 'the conservation aspects for which the Rye Water River has been designated are located upstream of the confluence with the River Liffey'. Therefore, no significant impacts were determined.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of this development's AA Screening, and that following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
N/A Tier 2	National Transport Authority Cycle Connects. Improving the cycle network within towns across Ireland.	• Various	Assuming temporal overlap of the construction of this development and the Proposed Project, there is the potential for interaction and in-combination effects on European sites. This project is currently at design stage and will be subject to planning. Therefore, it must comply with statutory planning requirements. Planning permission will only be granted if it can be concluded that there is no potential to adversely affect the integrity of European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4.	Given that this project will be subject to statutory planning requirements in relation to the protection of European sites, the distance of this project from the Proposed Project, and that following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project, there is no potential for the Proposed Project to act in-

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				• Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	combination with the 'other' project to result in adverse effects on the integrity of European sites.
N/A (N/A) N/A Tier 1	Uisce Éireann. National Leakage Reduction Programme This development programme consists of a nationwide upgrade of water and wastewater infrastructure and so while the exact location and timing of such works are unknown, it is considered likely that some works under this programme will occur in proximity to the Proposed Project while it is being constructed. Therefore, for the purpose of this assessment, it is assumed that there will be temporal overlap between this development and the Construction Phase of the Proposed Project. Precautionary to assume there is a source-pathway-receptor, therefore potential for in-combination effects to be considered.	• Various	Assuming temporal overlap of the construction of this development and the Proposed Project, there is the potential for interaction and in-combination effects on European sites. However, considering Uisce Éireann's environmental protection plans and policies within the National Water Resources Plan (and supporting Regional Water Resource Plans), and that alone the Proposed Project would not adversely affect the integrity of any European sites, the National Leakage Reduction Programme poses no identifiable risk of resulting in adverse effects on the integrity of any European sites in-combination with the Proposed Project.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within European sites and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of SPA boundaries. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction.	Given that this project will be subject to statutory planning requirements in relation to the protection of European sites, and that following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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				• Potential for in-combination effects within European sites and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	**Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. • All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
An Coimisiún Pleanála (318782) 912m Tier 1	Planning Permission to develop a Windfarm and Ancillary Infrastructure within the townlands of Ballycr (North), Belvoir, Cloghera, Cloonsheerea, Cloontra, Cloontra East, Cloontra West, Crag, Derrynaveagh, Derryvinnan, Drumsillagh, Sallybank (Merrit), Dro Within townlands of Co. Clare. Development is located approximately 2.5km northwest, at the closest point, from the Proposed Project. There is downstream connectivity to the Lower River Shannon SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.	• Lower River Shannon SAC • River Shannon and River Fergus Estuaries SPA	An NIS was completed for this 'other' project, which details that the project is hydrologically connected to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Therefore, there is potential for 'other' projects to act in-combination with this project to result in significant effects on surface water quality and disturbance effects on Qualifying Interest fish species, and otter.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4) • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4) • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor).	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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					The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Clare County Council (2360249) 20m to 250m Tier 1	Ten year planning permission for development at land to the west/north west of Ardnacrusha within the townlands of Castlebank, Glenlon North, Glenlon South, Drummin and Ballykeelaun, for the development of a solar farm on a site of approximately 70 hectares consisting of the following; up to 309,008 sq.m of solar photovoltaic panels on ground mounted steel frames; a 38 kV electrical substation with electrical control building and associated compound with palisade fence; the installation of up to 21 no. inverter/transformer stations on 7 no. hardstanding locations; underground power and communication cables and ducts, including underground cabling along the L3056 public road; new and upgraded internal access tracks (including stream crossings as required); 3 no. upgraded site entrances to the public road (one entrance to L-3054 (Lackyle Heights), and 2 no. entrances to L-30541); boundary fencing; landscaping and biodiversity enhancement measures; and all associated ancillary development, site works and services. The solar farm will be operational for 40 years. Development located west of the proposed 38 kV Uprate Works, north of Ardnacrusha. Water bodies within the development site have a downstream pathway to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.	• Lower River Shannon SAC • River Shannon and River Fergus Estuaries SPA	An NIS was completed for this 'other' project, which details that the project is hydrologically connected to the Lower River Shannon SAC and River Fergus Estuaries SPA, at downstream distances of 1.7km and 5.4km, respectively. Potential effects on European sites include the potential for waterborne pollution on downstream species and habitats, barrier effects on species, potential spread of invasive species, and injury/mortality of species.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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					plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Clare County Council (22591) Within Proposed Project (i.e. within the planning application boundary) Tier 1	Ten-year planning permission for a solar array. To consist of c. 265,000 m2 of solar panels, 8 control cabins, 2 ring main units, underground cabling, creation of a new entrance on L70382 and all associated ancillary site works. The solar array will connect to the national grid and will have an operational lifespan of 35 years. Ballyglass, Coolderry, Dromintobin North, Reanabrone and Oakfield (townlands), Ardnacrusha, Co. Clare. Townlands for the solar development overlap with the 38 kV Uprate. Pathway to the Lower River Shannon SAC (downstream pathway) and potential ex-situ impacts on Lough Derg (Shannon) SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.	• Lower River Shannon SAC	An NIS was completed for this 'other' project which details that the project is hydrologically connected to the Lower River Shannon SAC c. 5.9km downstream via the Blackwater (Clare) river. Therefore, construction works located in the same catchment have the potential to act in-combination with the 'other' project to result in a decline in water quality.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4) • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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Clare County Council (2460414) Tier 1	Shannon Commercial Enterprises DAC Construction of two light industrial facilities with ancillary office space, yard spaces, refuse stores with carparking, bicycle parking, ESB substations, switch room and associated site works. Ballymurtagh, Shannon Free Zone West, Shannon Co. Clare.	• Lower River Shannon SAC • River Shannon and River Fergus Estuaries SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA via the Shannon Wastewater Treatment Plant. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Clare County Council (2560108) Tier 1	KPH Construction Large Scale Residential Development. The proposed development includes: (i) Demolition of existing ruinous house / shed structures;	• Lower River Shannon SAC • River Shannon and River Fergus Estuaries SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA via the River Shannon. Therefore, construction works have the potential to act in-	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction**	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section

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	(ii) Construction of 101 no. residential units including 49 no. houses and 52 no. apartments comprising 28 no. one bed units; 24 no. two bed units; and 49 no. three bed units; Knockballynameath, Athlunkard, Co Clare.		combination with the 'other' project to result in a decline in water quality within European sites.	• Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
An Coimisiún Pleanála (320705) Tier 1	FuturEnergy Knockshanvo Designated Activity Company Proposed development of 9 no. wind turbines, 110kV substation and ancillary development. Located in the townlands of Snatty, Hurdlestown, Oatfield, Drumsillagh, Sallybank, Gortacullin, Aharinaghbeg, Knockshanvo, Cloontra, Cloghoolia, Ballycullen and others, County Clare. And	• Lower River Shannon SAC • River Shannon and River Fergus Estuaries SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA via onsite watercourses. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a

Authority (Application Reference) / Distance in Relation to the Proposed Project / Tier	Description and Address / Identification of In-Combination Effects	Relevant European Site(s)	Summary of the 'Other' Project's Potential Effects on the Relevant European Site(s)	Summary of the Proposed Project's Potential In-Combination Effects on the Relevant European Site(s)	Mitigation Measures	Conclusion
	Located in the townland of Court, County Limerick (https://knockshanvoplanning.ie)			accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
An Coimisiún Pleanála (320727) Tier 1	FuturEnergy Knockshanvo Designated Activity Company Proposed development of 110kV underground electrical cabling from the proposed Knockshanvo Wind Farm development to the existing Ardnacrusha 110kV electrical substation and ancillary development. Located in the townlands of Lakyle, Knockdonagh, Castlebank, Cloghera, Roo West, Drumsillagh or Sallybank (Merritt)(Parker), Glenon South, Trough and Ballykeelaun, County Clare.	• Lower River Shannon SAC • River Shannon and River Fergus Estuaries SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA via onsite watercourses. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-

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				• Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	combination with the 'other' project to result in adverse effects on the integrity of European sites.
Clare County Council (2460612) Tier 1	Ballina Killaloe Sports & Community Facilities Development Co. (Clarisford) Ltd. To develop a swimming platform, and associated site works. Moys, Killaloe, Co. Clare.	• Lower River Shannon SAC • Lough Derg (Shannon) SPA • River Shannon and River Fergus Estuaries SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Lower River Shannon SAC, Lough Derg (Shannon) SPA and the River Shannon and River Fergus Estuaries SPA as this project is located within the Parteen Basin. Therefore, construction works located in the same catchment have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4) • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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				• Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4) • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Clare County Council (2460416) Tier 1	Castlebank Green Energy Limited 10-year permission for a Solar Energy development with a total site area of 36.70 hectares. The Solar Farm would be operational for 40 years. The proposed grid route will connect the substation at the application site to the existing grid infrastructure at Ardnacrusha Power Station via a 38kV underground cable which is 1.2km in length (320m of which is on the local road L3056). Within the townlands of Castlebank Parteen Ballykeelaun and Drummin, Ardnacrusha, Co. Clare.	• Lower River Shannon SAC • River Shannon and River Fergus Estuaries SPA.	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA via onsite watercourses. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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				• Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Limerick County Council (24320705) Tier 1	SID FuturEnergy Knockshanvo Designated Activity Company Proposed development of 9 no. wind turbines, 110kV substation and ancilliary development located in the townlands of Snatty, Hurdlestown, Oatfield, Drumsillagh, Sallybank, Gortacullin, Aharinaghbeg, Knockshanvo, Cloontra, Cloghoolia, Ballycullen and others, County Clare. And located in the townland Court, Kildimo, Co. Limerick.	• Lower River Shannon SAC • River Shannon and River Fergus Estuaries SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation**	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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				• Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
An Coimisiún Pleanála (JN91.312428) Tier 1	Limerick City and County Council New distributor road of approximately 680m in length with a cross-section consisting of 9.7m wide carriageway including a 3.5m wide bus lane, footpaths, segregated cycle track, planted verges with 1 in 2 road embankment side slopes, linking Golf Links Road (from Schoolhouse Road junction) with Groody Road at Kilbane Roundabout, Castletroy, Limerick.	• Lower River Shannon SAC • River Shannon and River Fergus Estuaries SPA	An AA Screening has been completed for this 'other' project however, the Coimisiún has recommended an NIS be prepared, due to proximity of the project to the River Shannon and therefore, the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation**	Given the conclusion of this development's AA Screening, and that following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

Authority (Application Reference) / Distance in Relation to the Proposed Project / Tier	Description and Address / Identification of In-Combination Effects	Relevant European Site(s)	Summary of the 'Other' Project's Potential Effects on the Relevant European Site(s)	Summary of the Proposed Project's Potential In-Combination Effects on the Relevant European Site(s)	Mitigation Measures	Conclusion
				These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The AA Screening for the 'other' project objectively concluded that the project would not result in any likely significant effects (either directly or indirectly) on any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Limerick County Council (2460032) Tier 1	Riverpoint Construction ltd 99 no. residential units comprising of the following: 42 No. 2 storey, 3 bed, semi-detached units; 36 No. 2 storey, 4 bed, semi-detached units; 4 No.2 storey 4 bed detached units; 1 No. 2 storey, 3 bed detached unit and 2 no. blocks of 2 storey apartment units. Clonconane, Old Cratloe Road, Limerick.	• Lower River Shannon SAC • River Shannon and River Fergus Estuaries SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

Authority (Application Reference) / Distance in Relation to the Proposed Project / Tier	Description and Address / Identification of In-Combination Effects	Relevant European Site(s)	Summary of the 'Other' Project's Potential Effects on the Relevant European Site(s)	Summary of the Proposed Project's Potential In-Combination Effects on the Relevant European Site(s)	Mitigation Measures	Conclusion
					All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Limerick County Council (2460855) Tier 1	Board of Management Ardsoil Mhuire The demolition of the existing single storey school buildings (area 3,101m²) on site and the construction of an 8,387m² two and four storey 650 pupil post-primary school. The site is adjacent to the Lower Shannon SAC. Ardscoil Mhuire, College Park, Corbally.	• Lower River Shannon SAC • River Shannon and River Fergus Estuaries SPA	An NIS was completed for this 'other' project, which details that this project is in the same surface water catchment as the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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					predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Limerick County Council (2460864) Tier 1	Mary Philomena & Mary Clancy Demolition of an existing shed and construction of a residential development comprising 15 no. residential units. Lower Park, Corbally, Limerick.	• Lower River Shannon SAC • River Shannon and River Fergus Estuaries SPA	An AA Screening was completed for this 'other' project, which details that this project is hydrologically connected to the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. This AA Screening concluded, based on the best scientific knowledge available, that no significant effects whether arising from the project itself or in-combination with any other plan or project, are likely to occur to any European sites	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The AA Screening for the 'other' project objectively concluded that the project would not result in any likely significant effects (either directly or indirectly) on any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of	Given the conclusion of this development's AA Screening, and that following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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					European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
An Coimisiún Pleanála (JP91.322037) Tier 1	Limerick City and County Council Proposed rehabilitation works on Park Road Bridge, between Canal Bank and Lower Park Road, Limerick.	• Lower River Shannon SAC • River Shannon and River Fergus Estuaries SPA	The NIS for this 'other' project is not available online. Precautionary approach applied to assume potential pathways for effects due to proximity to the River Shannon and therefore the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Limerick County Council (2560113)	Groody Developments Limited Large-Scale Residential Development (LRD) - Purpose-Built Student Accommodation	• Lower River Shannon SAC	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below:	The relevant mitigation measures for the Proposed Project are summarised below: **Construction**	Given the conclusion of the 'other' project's NIS, and following the implementation of the

Authority (Application Reference) / Distance in Relation to the Proposed Project / Tier	Description and Address / Identification of In-Combination Effects	Relevant European Site(s)	Summary of the 'Other' Project's Potential Effects on the Relevant European Site(s)	Summary of the Proposed Project's Potential In-Combination Effects on the Relevant European Site(s)	Mitigation Measures	Conclusion
Tier 1	(PBSA) scheme consisting of 196 no. Bed Clusters, is distributed across 5 no. separate blocks,ranging in height from 5-8 storeys, with a total of 1,400 no. student bedspaces to be delivered in two phases of development Groody Road, Newcastle Castletroy, Limerick.	• River Shannon and River Fergus Estuaries SPA	Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	**Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Limerick County Council (2460334) Tier 1	Bridge Engineering Services Ltd New single storey office building, fabrication workshop with adjoining two storey mezzanine, a paint shed, a gas bottle storage cage, signage pylon, ESB sub-station and switch room and all associated site works.	• Lower River Shannon SAC • River Shannon and River Fergus Estuaries SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could

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	Bridge Engineering Services Ltd., Coolreiry & Woodpark, Castleconnell Co. Limerick.			• Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Limerick County Council (2461160) Tier 1	Eli Lilly (Kinsale) Limited The proposed development consists of extensions, modifications, alterations and new structures to previously permitted and partly built Biopharmaceutical Manufacturing Campus. The development consists of all site buildings and infrastructure required to support the new campus extension, including a 4-storey Biopharmaceutical Manufacturing Facility, extension to the previously permitted	• Lower River Shannon SAC • River Shannon and River Fergus Estuaries SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA via the Barnakyle River. Therefore, construction works located in the same catchment have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning).	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential

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	single storey Central Utilities Plant (CUP) Building, extension to previously permitted single storey pedestrian link, extension to the north-west side of the previously permitted 2-storey canteen, laboratory and administration building, extension to the south-east side of the previously permitted 2-storey canteen, laboratory and administration building, additional 2-storey Central Utilities Plant (CUP) Building sized, with 4no. Boiler Stacks The IDA Business and Technology Park, Raheen, County Limerick.			• Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Limerick County Council (2461282) Tier 1	Tergnum Properties Ltd 139no. residential units along with the provision of a creche.www.mungretlrd.com Lands at Rathmale, Mungret, Limerick.	• Lower River Shannon SAC • River Shannon and River Fergus Estuaries SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on

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				introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	the integrity of European sites.
Laois County Council (2460545) Tier 1	Breedon Materials Limited (trading as Breedon Ireland) Continued use and extension to existing permitted sand and gravel pit within an overall application area of c. 12.2 hectares. Extraction of sand and gravel (dry working) over an area of c. 8 hectares with processing and washing of material on site and all ancillary works and structures; site facilities. The proposed extraction operational period is for 10 years plus 1 year to complete restoration. Mounthall and Cummer townlands, Camross, Co. Laois.	• Slieve Bloom Mountains SPA • River Barrow and River Nore SAC	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the River Barrow and River Nore SAC via the Delour River. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites. This project is also located adjacent to the Slieve Bloom Mountains SPA and therefore, this project has the potential to result in impacts on hen harrier as a result of habitat loss/degradation and disturbance.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for temporary loss of low suitability habitat for foraging hen harrier • Potential for temporary localised disturbance/displacement effects on foraging hen harrier in areas of low suitability habitats	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP. • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4).	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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				Operation • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	**Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
Laois County Council (2560056) Tier 1	Kevin Flanagan Construction of an Enterprise & Employment Park to provide 5 no. serviced sites, on a site of 2.95ha. Townparks, Borris-in-Ossory, Co. Laois.	• River Barrow and River Nore SAC	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the River Barrow and River Nore SAC via an onsite drainage ditch and the River Nore. Therefore, construction works located in the same catchment have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP. • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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					indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
An Coimisiún Pleanála (321064) Tier 1	Statkraft Ireland 110kV Substation and Underground Grid Connection Located within the townland of Barranaghs, Garryhinch, Annamore in Co. Offaly & Forest Upper, Forest Lower, Coolnavarnoga, Coolaghy, Kilbride, Ballymorris, Cooltederry and Bracklone, Co. Laois (https://dernacartwindfarmsid.ie/)	• River Barrow and River Nore SAC	An NIS was completed for this 'other' project, which details that this project has hydrological connectivity to the River Barrow and River Nore SAC. Therefore, construction works have the potential to act in-combination with the 'other' project to result in significant effects on European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Sections 7.1.4 and 7.4.4.1.1). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to ensure that aquatic species are not killed as a result of construction works or through water quality impacts are detailed in Section 7.1.4 and in the CEMP • Mitigation to ensure that in-stream works do not pose a long-term barrier to fish species movement are detailed in Section 7.1.4 and in the CEMP. • Mitigation for otter: pre-construction surveys, buffer zones around holts to avoid impact/disturbance during construction, avoid fragmentation of otter habitat, demarcate prohibited working areas/buffer zones, acoustic noise barriers, mammal resistant fencing, no works within riparian zones during trenchless excavations (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Meath County Council (2460348) Tier 1	Cpac Modular Limited Modular building manufacturing facility and ancillary development. Ballymurphy, Dunshaughlin, Co. Meath.	• Rye Water Valley/Carton SAC • River Boyne and River Blackwater SAC • River Boyne and River Blackwater SPA	An AA Screening exercise was completed by Meath County Council for this 'other' project. It was noted that the Rye Water Valley/Carton SAC, River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA are in the vicinity of this project. However, it was concluded that no significant effects are likely to arise in relation to these European sites as a result of the development, either alone or in-	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling	Given the conclusion of this development's AA Screening, and that following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect

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			combination with other developments in the vicinity. It was accepted that the need for Stage 2 AA had been screened out by the planning authority.	accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4) • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The AA Screening for the 'other' project objectively concluded that the project would not result in any likely significant effects (either directly or indirectly) on any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	impacts that could adversely affect the integrity of this European site as a result of the Proposed Project, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Meath County Council (2460535) Tier 1	Uisce Éireann Construction of a new pumping station, flow splitting, dual cell aeration tank including dual anoxic zones, 2 No. new final settlement tanks, waste activated sludge (WAS) and return activated sludge (RAS) pumping stations, ferric sulphate dosing system including bunded chemical storage tank, control kiosk, sludge holding tank, solar PV panel installation capable of a maximum power generation of 10% of WwTP power requirements, influent & effluent site pipework to & from the proposed infrastructure, extension of the existing site roads to the proposed infrastructure, new flood protection wall. Longwood Waste Water Treatment Plant, Longwood, County Meath.	• River Boyne and River Blackwater SAC • River Boyne and River Blackwater SPA	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the River Boyne and River Blackwater SAC and the River Boyne and River Blackwater SPA. Therefore, construction works have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures,	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4) • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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				could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
An Coimisiún Pleanála (320738) Tier 1	GP Joule Ireland Limited Proposed development of 220kV 'Loop in' Substation, Battery Energy Storage System, Overhead lines, and associated works. Located in the townlands of Mulhussey & Kilclone, County Meath (https://theblackhallsubstationsid.ie/).	• Rye Water Valley/Carton SAC	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Rye Water Valley/Carton SAC. Therefore, construction works located in the same catchment have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS are similar to those required during testing and commissioning and are detailed in Section 7.1.4 of this document, in the CEMP (EIAR Appendix A5.1), and in Chapter 5 of the EIAR (Construction & Commissioning). All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
Wicklow County Council (2460257) Tier 1	Solas Eireann Development Limited Solar PV energy development and grid route, with a total site area of 28 hectares comprising of the construction of PV panels mounted on metal frames, transformer stations, new access tracks, perimeter fencing with CCTV cameras and access gates, temporary construction compounds, 20 kV underground cabling connecting the solar farm to the existing Blessington 38kV ESB Substation, and all ancillary grid infrastructure and associated works. The solar farm would be operational for 35 years.	• Poulaphouca Reservoir SPA	An NIS was completed for this 'other' project, which details that this project is located in proximity to, and is hydrologically connected to the Poulaphouca Reservoir SPA. Therefore, construction works have the potential to act in-combination with the 'other' project to result in disturbance and habitat loss impacts on SCI species associated with the Poulaphouca Reservoir SPA.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for temporary loss of habitat within the foraging range of SCI species associated with the Poulaphouca Reservoir SPA • Potential for temporary localised disturbance/displacement effects on SCI species associated with the Poulaphouca Reservoir SPA The habitats affected by the Proposed Project will be temporarily unavailable during construction works and the area of habitats that would be affected is small in comparison to the foraging range of SCI species associated with the Poulaphouca Reservoir SPA. Therefore, the NIS for the Proposed Project concludes that there is no potential for impacts associated with the Proposed Project to result in any significant	The NIS for the Proposed Project concludes that there is no potential for impacts associated with the Construction or Operational Phase of the Proposed Project that could adversely affect the integrity of the Poulaphouca Reservoir SPA. Therefore, no mitigation measures are required. The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project, and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result

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	Townlands of Threecastles Crosscoolharbour Santryhill Newpaddocks Oldpaddocks and Edmonstown, Blessington, County Wicklow.			adverse effects on the wintering bird populations of the Poulaphouca Reservoir SPA.		in adverse effects on the integrity of European sites.
N/A Tier 2	M20 Cork to Limerick The scheme consists of the development of a high-quality route connecting Cork to Limerick	• Lower River Shannon SAC • River Fergus Estuaries SPA	Assuming temporal overlap of the construction of this development and the Proposed Project, there is the potential for interaction and in-combination effects on European sites. This project is currently at design stage and will be subject to planning. Therefore, it must comply with statutory planning requirements. Planning permission will only be granted if it can be concluded that there is no potential to adversely affect the integrity of European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	Given that this project will be subject to statutory planning requirements in relation to the protection of European sites, the distance of this project from the Proposed Project, and that following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
N/A Tier 2	N21/N69 Limerick to Adare to Foynes The project consists of 16km road from Foynes to Rathkeale with a single carriageway link road to the existing N69 at Askeaton and 16Km motorway from Rathkeale to Attyflin, east	• Lower River Shannon SAC • River Fergus Estuaries SPA	An NIS was completed for this project, which details that the project intersects with the Lower River Shannon SAC and is in close proximity (c. 200m) and hydrologically connected to the River Shannon and River Fergus Estuaries SPA. Therefore, there is potential for 'other' projects to act in-combination with this project to result in significant effects arising from temporary disturbance of vegetation, surface water	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could

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	of Adare (incorporating the Adare Bypass).		pollution, disturbance and mortality of species, invasive species spread and air quality.	• Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
N/A Tier 2	Limerick to Scarriff Greenway The proposed 40Km Greenway envisages a greenway that would begin in Limerick City and travel as far as Scarriff Harbour, passing close to the Errina Canal and River Blackwater, with connections to nearby villages and towns such as Cloonlara, O'Briensbridge, Killaloe, Ogonolloe	• Lower River Shannon SAC • River Fergus Estuaries SPA	Assuming temporal overlap of the construction of this development and the Proposed Project, there is the potential for interaction and in-combination effects on European sites. This project is currently at option selection stage and will be subject to planning. Therefore, it must comply with statutory planning requirements. Planning permission will only be granted if it can be concluded that there is no potential to adversely affect the integrity of European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning).	Given that this project will be subject to statutory planning requirements in relation to the protection of European sites, and that following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the

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				• Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	integrity of this European site as a result of the Proposed Project, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.
N/A Tier 2	King's Island Flood Relief Scheme This project is a flood relief scheme for Kings Island, Limerick	• Lower River Shannon SAC • River Fergus Estuaries SPA	An NIS was completed for this project, which described that works would occur within the Lower River Shannon SAC, and that the project is hydrologically connected to the River Shannon and River Fergus Estuaries SPA. It was determined that if construction periods were to overlap, there is potential to temporarily impact on Lower River Shannon SAC through reduced surface water quality.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on

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				introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	the integrity of European sites.
N/A Tier 2	Limerick Flood Relief Scheme This project is a flood relief scheme for Limerick	• Lower River Shannon SAC • River Fergus Estuaries SPA	Assuming temporal overlap of the construction of this development and the Proposed Project, there is the potential for interaction and in-combination effects on European sites. This project is currently at design stage and will be subject to planning. Therefore, it must comply with statutory planning requirements. Planning permission will only be granted if it can be concluded that there is no potential to adversely affect the integrity of European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4.	Given that this project will be subject to statutory planning requirements in relation to the protection of European sites, and that following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on

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				• Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	the integrity of European sites.
N/A Tier 2	Shannon Flood Relief Scheme This project will deliver a new Flood Relief Scheme for Shannon, Co Clare	• Lower River Shannon SAC • River Fergus Estuaries SPA	Assuming temporal overlap of the construction of this development and the Proposed Project, there is the potential for interaction and in-combination effects on European sites. This project is currently at consultation stage and will be subject to planning. Therefore, it must comply with statutory planning requirements. Planning permission will only be granted if it can be concluded that there is no potential to adversely affect the integrity of European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements.	Given that this project will be subject to statutory planning requirements in relation to the protection of European sites, the distance of this project from the Proposed Project, and that following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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				• Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	• Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
N/A Tier 2	Electricity Transmission Network: Capital Project 966 Proposed electricity infrastructure project to strengthen the electricity network between the Dunstown substation in Kildare and the Woodland station in Meath. Capital Project 966 is a proposed development that will help transfer electricity to the east of the country and distribute it within the network in Meath, Kildare and Dublin. The project will help to meet growing demand for electricity in the east of the country (Meath, Kildare, Dublin) and integrate generation in the West and South West.	• Rye Water Valley/Carton SAC • River Boyne and River Blackwater SAC	An NIS was completed for this 'other' project, which details that this project is hydrologically connected to the Rye Water Valley/Carton SAC and the River Boyne and River Blackwater SAC. Therefore, construction works located in the same catchment have the potential to act in-combination with the 'other' project to result in a decline in water quality within European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. **Operation** • Potential for in-combination effects during operation on downstream habitats through an accidental chemical spills and increased silt-sediment loading from scour or erosion during discharge. • Potential for in-combination effects on downstream habitats through the introduction of INNS to the surface water network during operation. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or	Given the conclusion of the 'other' project's NIS, and following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project. Therefore, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites

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					indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	
N/A Tier 2	Castletroy Wastewater Treatment Plant This project is to deliver a scheme that caters for future growth and ensures compliance with the UWWTD and with WWDA requirements.	• Lower River Shannon SAC • River Fergus Estuaries SPA	Assuming temporal overlap of the construction of this development and the Proposed Project, there is the potential for interaction and in-combination effects on European sites. This project is currently at design stage. It has been confirmed that an AA is required, and an NIS shall be prepared in respect of this project. Planning permission will only be granted if it can be concluded that there is no potential to adversely affect the integrity of European sites.	The relevant potential impacts, as identified for this Proposed Project, which may act in-combination with the 'other' project, are detailed below: **Construction** • Potential for in-combination effects arising from habitat loss and fragmentation during construction. • Potential for habitat degradation as a result of excavation and tunnelling during construction. • Potential for in-combination effects during construction on downstream habitats through an accidental spillage of cement-based products or accidental spillage of hydrocarbons. • Potential for in-combination air quality effects on terrestrial and aquatic vegetation as a result of dust impacts during construction. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during construction. • Potential for in-combination disturbance/displacement effects on fauna species during construction. • Potential for in-combination mortality risk effects to fauna species during construction. • Potential for in-combination barrier effects on fauna species during construction. • Potential for in-combination habitat loss and disturbance effects on bird species outside of the SPA boundary. **Operation** • Potential for in-combination effects on water quality arising from repair and maintenance works required on the pipeline. • Potential for in-combination effects within the SAC and on downstream habitats through the introduction of INNS to the surface water network during operational repair and maintenance works. These potential impacts as a result of the Proposed Project alone, in the absence of mitigation measures, could result in adverse effects on the integrity of European sites within the ZoI of the Proposed Project.	The relevant mitigation measures for the Proposed Project are summarised below: **Construction** • Mitigation for habitat loss and fragmentation: vegetation clearance will be undertaken in accordance with Section 7.1.4 and the CEMP, habitats of value will be retained where possible, the minimum working area required for the construction of the RWI&PS will be delineated and fenced off at the outset, concrete revetment mats will be employed with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna, confirmatory pre-construction otter surveys will be undertaken and suitable measures employed in accordance with Section 7.1.4. • Mitigation to prevent habitat degradation as a result of excavation and tunnelling will be employed during the construction phase in accordance with Section 7.1.4 and EIAR Chapter 5 (Construction and Commissioning). • Mitigation for water quality: CEMP, SWMP, method statements for protecting waters, all works in accordance with IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), no instream works during annual close season, erection of silt fencing/curtains, buffer zones on river channels during construction (e.g., for storage, stockpiling etc.), refuelling on impermeable and bunded areas, trenchless crossings where possible, use of clear span bridges during construction (Section 7.1.4). • Mitigation for air quality to ensure potential dust impacts will not affect terrestrial and aquatic vegetation is detailed in Section 7.1.4. • Mitigation for the spread of INNS through biosecurity measures, demarcate prohibited working areas/buffer zones, all in accordance with CEMP (Section 7.1.4). • Mitigation to prevent disturbance/displacement of fauna during construction activities is detailed in Section 7.1.4, and includes the use of noise abatement measures, acoustic screens and equipment requirements. • Mitigation to prevent mortality risk to fauna species is detailed in Section 7.1.4 and includes the use of mammal fencing, electrofishing, and intake screens for the intake chamber. • Mitigation to prevent barrier effects on fauna species including the avoidance of in-stream works during the annual close season, adherence to IFI guidelines, and retention of access to the riparian zone for otter. • Habitat loss areas directly affected by the Proposed Project would be reinstated post-construction. **Operation** • Mitigation for water quality: similar to those required during testing and commissioning and are as detailed in Section 7.1.4 and in Chapter 5 of the EIAR (Construction & Commissioning). • Mitigation for the spread of INNS during operation has been incorporated into the design of the Proposed Project and are detailed in Section 7.1.4. All mitigation measures will be implemented, under supervision of both a Project Ecologist (employed by Uisce Éireann) and an ECoW (employed by the appointed Contractor). The NIS for the 'other' project objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the project and with the implementation of the mitigation measures proposed, that the project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion. No additional mitigation measures are required beyond what is outlined for the Proposed Project alone, to avoid the potential for adverse effects on the integrity of	Given that this project will be subject to statutory planning requirements in relation to the protection of European sites, the distance of this project from the Proposed Project, and that following the implementation of the mitigation measures detailed in Section 7.1.4., there are no direct or indirect impacts that could adversely affect the integrity of this European site as a result of the Proposed Project, there is no potential for the Proposed Project to act in-combination with the 'other' project to result in adverse effects on the integrity of European sites.

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					European sites as a consequence of the Proposed Project acting in-combination with this 'other' project.	

Note:
[a] All plans, as listed in Table 8.2 are not listed in this table again but have also been considered in-combination with the Proposed Project for potential impact pathways to the European sites noted above.

8.2 Conclusion of In-Combination Assessment

1602. As noted in Section 7, the Proposed Project would not, either alone or in-combination with other plans or projects, adversely affect the integrity of the following European sites:

- Lower River Shannon SAC
- Lisduff Fen SAC
- Sharavogue Bog SAC
- River Barrow and River Nore SAC
- Lough Derg, North-east Shore SAC
- Rye Water Valley/Carton SAC
- Charleville Wood SAC
- River Boyne and River Blackwater SAC
- River Shannon Callows SAC
- Slievefelim to Silvermines Mountain SPA
- Slieve Bloom Mountains SPA
- Lough Derg (Shannon) SPA
- Dovegrove Callows SPA
- River Little Brosna Callows SPA
- River Shannon and River Fergus SPA
- Slieve Aughty Mountains SPA
- River Boyne and River Blackwater SPA
- Poulaphouca Reservoir SPA
- Middle Shannon Callows SPA.

1603. It would not result in the loss or fragmentation of any qualifying interest habitats, or habitats supporting populations of qualifying interest/special conservation interest species within or associated with any European site. It would also not degrade any such habitats or affect species as a result of abstraction, excavation, trenchless crossings, open trench crossings, hydrogeological impacts (quality or quantity), or introducing/spreading INNS, nor would it case a barrier effect or pose a mortality risk to qualifying interest/special conservation interest species that would have any effect on their conservation objectives.

1604. However, the potential direct or indirect residual impacts associated with the Proposed Project, whilst not of a magnitude to result in adverse effects on European site integrity themselves, were also considered to assess whether there was the potential for other plans or projects to have similar low-level impacts. These could potentially act in-combination to adversely affect the integrity of any/all of these European sites.

1605. The in-combination assessment has concluded that there is no potential for adverse effects on the integrity of any of the above listed European sites to arise as a consequence of the Proposed Project acting in-combination with any other plans or projects.

9. NIS Conclusion

1606. This NIS has examined and analysed, in light of the best scientific knowledge, with respect to those European sites within the ZoI of the Proposed Project, the potential impact sources and pathways, how these could impact on the European sites' qualifying interest habitats and qualifying interest/special conservation interest species and whether the predicted impacts would adversely affect the integrity of the European sites.

1607. Avoidance, design requirements and mitigation measures are set out within this report and its appendices and they ensure that any adverse effects (alone or in-combination with other plans or projects) on the integrity of European sites will be avoided during the construction and operation of the Proposed Project.

1608. It has been objectively concluded by Jacobs TOBIN following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the Proposed Project and with the implementation of the mitigation measures proposed, that the Proposed Project would not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion.

10. References

Air Pollution Information System (APIS) (2024a). Site Relevant Critical Loads and Source Attribution GIS mapping tool. Available from: https://www.apis.ac.uk/app [Accessed October 2025].

Air Pollution Information System (APIS) (2024b). Habitat/species pollutant impacts database. Available from: https://www.apis.ac.uk/search-pollutant-impacts [Accessed October 2025].

An Foras Talúntais (1966). Soils of County Limerick. Available from: https://www.teagasc.ie/media/website/environment/soil/Limerick.pdf [Accessed October 2025]

An Foras Talúntais (1970). Soils of County Kildare. Available from: https://www.teagasc.ie/media/website/environment/soil/Kildare.pdf [Accessed October 2025]

An Foras Talúntais (1971). Soils of County Clare. Available from: https://www.teagasc.ie/media/website/environment/soil/Clare.pdf [Accessed October 2025]

An Foras Talúntais (1980). General Soil Map of Ireland. Available from: https://www.teagasc.ie/media/website/environment/soil/General-Map.pdf [Accessed October 2025]

An Foras Talúntais (1993). Soils of County Tipperary, North Riding. Available from: https://www.teagasc.ie/media/website/environment/soil/North-Tipperary.pdf [Accessed October 2025]

Aughney, T., Roche, N., & Langton, S (2018) The Irish Bat Monitoring Programme 2015-2017. *Irish Wildlife Manuals*, No. 103. National Parks and Wildlife Service, Department of Cultural heritage and the Gaeltacht, Ireland.

Baglinière, J. L., & Champigneulle, A. (1986). Population estimates of juvenile Atlantic salmon, Salmo salar, as indices of smolt production in the R. Scorff, Brittany. *Journal of Fish Biology*, *29*(4), 467-482.

Baker, G., Crean, D. and Moran, S. (2007) Establishing Natural Background Levels for Groundwater Quality in Ireland. GSI Groundwater Newsletter No. 46.

Bat Conservation Ireland (2025). Bat Record Maps. Available from: https://www.batconservationireland.org/what-we-do/monitoring-distribution-projects/bat-record-maps [Accessed October 2025].

Bat Conservation Trust (BCT) (2023). Bats and Artificial Lighting at Night. Guidance Note 08/23. Available from: https://theilp.org.uk/publication/guidance-note-8-bats-and-artificial-lighting/ [Accessed October 2025]

Bat Tree Habitat Key (2018). Bat Roosts in Trees – A Guide to Identification and Assessment for Tree-Care and Ecology Professionals. Exeter: Pelagic Publishing.

Billington, G. E. & Norman, G. M. (1997). A report on the survey and conservation of bat roosts in bridges in Cumbria, Kendal. English Nature.

BirdWatch Ireland (BWI) (2017). I-WeBS Counter Manual – Guidelines for Irish Wetland Bird Survey Counters. Available from: http://www.birdwatchireland.ie/LinkClick.aspx?fileticket=Ih2CTtw9bjs%3D. [Accessed October 2025]

BirdWatch Ireland (BWI) (2024). Irish Wetland Bird Survey (I-WeBS) dataset. Data was supplied by the Irish Wetland Bird Survey (I-WeBS), a scheme coordinated by BirdWatch Ireland under contract to the National Parks and Wildlife Service of the Department of Housing, Local Government and Heritage Available from: https://birdwatchireland.ie/publications_category/irish-wetland-bird-survey-iwebs/ [Accessed October 2025]

Bjorn, T. C., & Reiser, D. W. (1991). Habitat requirements of salmonids in streams. *American Fisheries Society Special Publication*, *19*(837), 138.

Black, J. L., & Perry, E. S. (2014). Laboratory Evaluation of the Survival of Fish Impinged on Modified Traveling Water Screens. *North American Journal of Fisheries Management, 34*(2), 359-372.

Boland, H., & Crowe, O. (2012). Irish wetland bird survey: waterbird status and distribution 2001/02 2008/09. *BirdWatch Ireland, Kilcoole, Co. Wicklow*.

British Standards Institution (BSI) (2014a). BS 5228-2:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Vibration.

British Standards Institution (BSI) (2014b). BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Noise.

Bromley, R., Coyle, S., Hawley, K., Anderson, K. and Turnpenny, A.W.H. (2014). UK best practice fish screening trials study. *International Fish Screening Techniques*. WIT Transactions on State-of-the-art in Science and Engineering Transaction. Volume 71. pp 89-100. WIT Press, Southampton, U.K

Brophy, J.T and Long, M.P. (2019) Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*) (IWM 104). Appendix V. *Vertigo geyeri* site reports in Long, M.P. & Brophy, J.T. (2019) Monitoring of sites and habitat for three Annex II species of whorl snail (Vertigo). Irish Wildlife Manuals, No. 104. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

Bunt C., T. Castro-Santos & A. Haro (2012). Performance of fish passage structures at upstream barriers to migration. River Res. Applic. 28(4), p. 457-478.

Burke, B., Lewis, J.L., Fitzgerald, N., Frost, T., Austin, G., and Tierney, T.D. (2018). Estimates of waterbird numbers wintering in Ireland, 2011/12-2015/16. *Irish Birds* No 41 11:1-12.

Byrne, A., Moorkens, E.A., Anderson, R., Killeen, I.J. & Regan, E.C. (2009). Ireland Red List No. 2 – Non-Marine Molluscs. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Carney, K. M., & Sydeman, W. J. (1999). A review of human disturbance effects on nesting colonial waterbirds. *Waterbirds*, 68-79.

CEN (2005) Water Quality Sampling of Fish with Multi-Mesh Gillnets. European Committee for Standardization, EN 14757.

Chakraborti, R. K., Madon, S., & Kaur, J. (2016). Costs for controlling dreissenid mussels affecting drinking water infrastructure: Case studies. *Journal-American Water Works Association*, *108*(8), E442-E453.

Charman, D. (2002). *Peatlands and environmental change*. John Wiley & Sons Ltd.

Chartered Institute of Ecology and Environmental Management (CIEEM) (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater and Coastal. Version 1.2. Updated 2022.

Chartered Institute of Ecology and Environmental Management (CIEEM) (2021). Advisory Note: Ecological Assessment of Air Quality Impacts. Available from: https://cieem.net/wp-content/uploads/2020/12/Air-Quality-advice-note.pdf [Accessed October 2025]

Chartered Institution of Building Services Engineers (2016). Lighting Guide LG06: The Exterior Environment.

Clare County Council (2023). Clare County Development Plan 2023-2029. https://www.clarecoco.ie/services/planning/clarecountydevelopmentplan23-2029/ [Accessed October 2025]

Commission Internationale de l'Eclairage (2017). 150:2017 Guide on the Limitation of Effects of Obtrusive Lighting from Outdoor Lighting Installations 2nd Edition. Clarke, R., & Watson, D. (1997). The hen harrier winter roost survey. Raptor, 24, 41-45.

Collins, J. (Ed.). (2016). Bat surveys for professional ecologists: good practice guidelines. Bat Conservation Trust.

Collins, J. (ed.) (2023). Bat Surveys for Professional Ecologists: Good Practice Guidelines (5th edition). The Bat Conservation Trust, London.

Construction Industry Research and Information Association (CIRIA) (1997). (SP133) Waste minimisation in construction – site guide. Available from: https://www.ciria.org/ItemDetail?iProductCode=SP133D&Category=DOWNLOAD [Accessed October 2025]

Construction Industry Research and Information Association (CIRIA) (2001). Control of Water Pollution from Construction Sites. Report No C532D. Available from: https://www.ciria.org/ItemDetail?iProductCode=C532D&Category=DOWNLOAD [Accessed October 2025]

Construction Industry Research and Information Association (CIRIA) (2006). Control of Water Pollution from Linear Construction Projects. Report No. C648D. Available from: https://www.ciria.org/ItemDetail?iProductCode=C649D&Category=DOWNLOAD [Accessed October 2025]

Construction Industry Research and Information Association (CIRIA) (2010). Culvert design and operation guide (C689F). Available from: https://www.ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductCode=C689F&Category=FREEPUBS [Accessed October 2025]

Construction Industry Research and Information Association (CIRIA) (2015). The SuDS Manual (C753). Available from: https://www.ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductCode=C753. [Accessed October 2025].

Construction Industry Research and Information Association (CIRIA) (2016). Groundwater Control: Design and Practice 2nd Edition (C750).

Cummins, S, Fisher, J., McKeever, R., McNaghten, L. & Crowe, O. (2010) Assessment of the distribution and abundance of Kingfisher and other riparian birds on six SAC river systems in Ireland. National Parks and Wildlife Service.

Currie, F., & Elliott, G. (1997). Forests and Birds: a guide to managing forests for rare birds. RSPB. Forestry Authority. Cutts, N., Phelps, A., & Burdon, D. (2009). Construction and waterfowl: Defining sensitivity, response, impacts and guidance. *Institute of Estuarine and Coastal Studies (IECS), University of Hull*.

Cutts N, Hemingway K and Spencer J (2013). The Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning and Construction Projects. Produced by the Institute of Estuarine and Coastal Studies (IECS). Version 3.2.

Department of Arts, Heritage and the Gaeltacht (DAHG) (2010). Site Synopsis for River Boyne and River Blackwater SPA [004232]. Available from: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004232.pdf [Accessed October 2025].

Department of Arts, Heritage and the Gaeltacht (DAHG) (2011). Site Synopsis for Dovegrove Callows SAC [004137]. Available from: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004137.pdf [Accessed October 2025].

Department of Arts, Heritage and the Gaeltacht (DAHG) (2012). Site Synopsis for Middle Shannon Callows SPA [004096]. Available from: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004096.pdf [Accessed October 2025].

Department of Arts, Heritage and the Gaeltacht (DAHG) (2013a). Site Synopsis for Lower River Shannon SAC [002165]. Version: 002165_Rev13.Doc. Available from: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002165.pdf [Accessed October 2025].

Department of Arts, Heritage and the Gaeltacht (DAHG) (2013b). Site Synopsis for Lisduff Fen SAC [002147]. Version: 002147_Rev13.Doc. Available from: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002147.pdf [Accessed October 2025]

Department of Arts, Heritage and the Gaeltacht (DAHG) (2013c). Site Synopsis for Rye Water Valley/Carton SAC [001398]. Version: 001398_Rev13.Doc. Available from: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY001398.pdf [Accessed October 2025]

Department of Arts, Heritage and the Gaeltacht (DAHG) (2014a). Site Synopsis for Lough Derg, North-east Shore SAC [002241]. Version: 002241_Rev13.Doc. Available from: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002241.pdf [Accessed October 2025]

Department of Arts, Heritage and the Gaeltacht (DAHG) (2014b). Site Synopsis for River Boyne and River Blackwater SAC [002299]. Version: 002299_Rev13.Doc. Available from: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002299.pdf [Accessed October 2025]

Department of Arts, Heritage and the Gaeltacht (DAHG) (2014c). Site Synopsis for Lough Derg (Shannon) SPA [004058]. Available from: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004058.pdf [Accessed October 2025]

Department of Arts, Heritage and the Gaeltacht (DAHG) (2014d). Site Synopsis for River Little Brosna Callows SPA [004086]. Available from: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004086.pdf [Accessed October 2025]

Department of Arts, Heritage and the Gaeltacht (DAHG) (2014e). Site Synopsis for Poulaphouca Reservoir SPA [004063]. Available from: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004063.pdf [Accessed October 2025]

Department of Arts, Heritage and the Gaeltacht (DAHG) (2015a). Site Synopsis for Slievefelim to Silvermines Mountains SPA [004165]. Available from: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004165.pdf [Accessed October 2025]

Department of Arts, Heritage and the Gaeltacht (DAHG) (2015b). Site Synopsis for Slieve Bloom Mountains SPA [004160]. Available from: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004160.pdf [Accessed October 2025]

Department of Arts, Heritage and the Gaeltacht (DAHG) (2015c). Site Synopsis for Slieve Aughty Mountains SPA [004168]. Available from: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004168.pdf [Accessed October 2025]

Department of Arts, Heritage and the Gaeltacht (DAHG) (2017). Site Synopsis for Sharavogue Bog SAC [000585]. Version: 000585_Rev17.Docx. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000585.pdf [Accessed October 2025]

Department of Arts, Heritage and the Gaeltacht (DAHG) (2020). Site Synopsis for Charleville Wood SAC [000571]. Version: 000571_Rev20.Docx. Available from: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY000571.pdf [Accessed October 2025]

Department of Communications, Marine and Natural Resources (2005). Guidelines on the Construction & Operation of Small-Scale Hydro-Electric Schemes and Fisheries. Central Fisheries Board. June 2005. Available at: https://www.fisheriesireland.ie/sites/default/files/migrated/docman/hydro.pdf. [Accessed: October 2025]

Department of Housing, Local Government and Heritage (DHLGH) (2020). Site Synopsis for River Shannon Callows SAC [000216]. Version: 000216_Rev20.Docx. Available from: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY000216.pdf [Accessed October 2025]

Department of Housing, Local Government and Heritage (DHLGH) (2024a). Water Action Plan 2024: A River Basin Management Plan for Ireland. Available from: https://www.gov.ie/en/policy-information/8da54-river-basin-management-plan-2022-2027/ [Accessed October 2025]

Department of Housing, Local Government and Heritage (DHLGH) (2024b). Site Synopsis for River Barrow and River Nore SAC [002162]. Version: 002162_Rev24.Docx. Available from: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002162.pdf [Accessed October 2025]

Department of Housing, Local Government and Heritage (DHLGH) (2024c). Water Services Policy Statement 2024-2030. Available from: https://www.gov.ie/en/publication/443cc-water-services-policy-statement-2024-2030/ [Accessed October 2025]

Department of Housing, Local Government and Heritage (DHLGH) (n.d). National Planning Applications. Available from: https://data.gov.ie/dataset/national-planning-applications [Accessed October 2025]

Department of Housing, Planning and Local Government (DHPLG) (n.d.). EIA Portal. Available from: https://www.housing.gov.ie/planning/environmental-assessment/environmentalimpact-assessment-eia/eia-portal [Accessed October 2025]

Department of Public Expenditure and Reform (2015). Building on Recovery: Infrastructure and Capital Investment 2016-2021. Available from: https://www.gov.ie/pdf/?file=https://assets.gov.ie/9967/171045a52627428eb387a2ccff21db84.pdf#page=null [Accessed October 2025]

Department for Public Expenditure, NDP Delivery and Reform (2024). MyProjectIreland Interactive Map and Tracker. Available from: https://www.gov.ie/en/collection/f828b-myprojectireland-interactive-map/ [Accessed October 2025]

Dublin City Council (2022). Dublin City Development Plan 2022-2028. Available from: https://www.dublincity.ie/residential/planning/strategic-planning/dublin-city-development-plan/development-plan-2022-2028 [Accessed October 2025]

Dún Laoghaire-Rathdown County Council (2022). Dún Laoghaire-Rathdown County Development Plan. Available from: https://www.dlrcoco.ie/CDP2022-2028 [Accessed October 2025]

Eastern and Midland Regional Assembly (2019). Regional Spatial and Economic Strategy for the Midland and Eastern Region. Available from: https://www.emra.ie/rses-download/EMRA-RSES.pdf [Accessed October 2025]

EDEN (Environmental Data Exchange Network) (n.d.). Available from: https://www.edenireland.ie/ [Accessed October 2025]

Eirgrid (2020). Ecology Guidelines for Electricity Transmission Projects. A Standard Approach to Ecological Impact Assessment of High Voltage Transmission Projects. Natura Environmental Consultants. Available from: http://www.eirgridgroup.com/site-files/library/EirGrid/Ecology-Guidelines-for-Electricity-Transmission-Projects.pdf [Accessed October 2025]

EirGrid (2024). Network Delivery Portfolio Publication Q2 2024. Available from: https://www.eirgrid.ie/grid/grid-reports-and-planning/network-delivery-portfolio [Accessed October 2025]

Electricity Supply Board (ESB) (n.d.). Fisheries Information. Available from: https://www.esb.ie/acting-responsibly/fisheries-2/fisheries [Accessed October 2025]

Environmental Protection Agency (n.d.). EPA Geoportal Site. Available from: https://gis.epa.ie/ [Accessed October 2025]

Environmental Protection Agency (2021). Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction and Demolition Projects. Available from: Best practice guidelines for the preparation of resource & waste management plans for construction & demolition projects [Accessed October 2025]

Environmental Protection Agency (2025a). Online Environmental Map Viewer. Available from: https://gis.epa.ie/EPAMaps/ [Accessed October 2025]

Environmental Protection Agency (2025b). Catchments.ie. Available from: https://www.catchments.ie/. [Accessed October 2025].

Environmental Protection Agency (2025c). The Environmental Protection Agency Ireland's Open Data Portal. Available from: https://data.epa.ie/api-list/wfd-open-data/ [Accessed October 2025]

Environmental Protection Agency (2025d). Water Environment Maps. Available from: https://gis.epa.ie/EPAMaps/Water [Accessed October 2025]

Environmental Protection Agency Catchments Unit (2021). Crayfish Plague Outbreak – Clodiagh (Tullamore) River, County Offaly. Available from: https://www.catchments.ie/crayfish-plague-outbreak-clodiagh-tullamore-river-county-offaly/ [Accessed October 2025]

European Commission (2003). Common Implementation Strategy for the Water Framework Directive (2000/60/EC). Identification of Water Bodies. CIS Guidance Document No. 2. Available from: https://circabc.europa.eu/sd/a/655e3e31-3b5d-4053-be19-15bd22b15ba9/Guidance%20No%202%20-%20Identification%20of%20water%20bodies.pdf [Accessed October 2025]

European Commission (2008) Restoring raised bogs in Ireland. LIFE04 NAT/IE/000121. Available from: https://webgate.ec.europa.eu/life/publicWebsite/project/LIFE04-NAT-IE-000121/restoring-raised-bogs-in-ireland [Accessed October 2025]

European Commission (2013). Interpretation manual of European Union habitats–EUR28.

European Commission (2021). The Strict Protection of Animal Species of Community Interest Under the Habitats Directive. Guidance Document: A Summary. Available from: https://op.europa.eu/en/publication-detail/-/publication/bbc7ace0-27e2-11ec-bd8e-01aa75ed71a1/language-en [Accessed October 2025]

Feeley, H. B., Bradley, C., Free, G., Kennedy, B., Little, R., McDonnell, N., Plant, C., Trodd, W., Wynne, C. & Boyle, S. O. (2020). A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007–2018. Scientific Data, 7(1), 1-9.

Ferrer, M., Morandini, V., Baumbusch, R., Muriel, R., De Lucas, M., & Calabuig, C. (2020). Efficacy of different types of "bird flight diverter" in reducing bird mortality due to collision with transmission power lines. *Global Ecology and Conservation*, *23*, e01130.

Fingal County Council (2023). Fingal Development Plan 2023-2029. Available from: https://www.fingal.ie/development-plan [Accessed October 2025]

Forfás (2008). Assessment of Water and Waste Water Services for Enterprise. Available from: https://enterprise.gov.ie/en/publications/publication-files/forf%C3%A1s/assessment-of-water-and-waste-water-services-for-enterprise.pdf [Accessed October 2025]

Fossitt, J. A. (2000). A Guide to Habitats in Ireland. Heritage Council/Chomhairle Oidhreachta. Available from: https://www.npws.ie/sites/default/files/publications/pdf/A%20Guide%20to%20Habitats%20in%20Ireland%20-%20Fossitt.pdf [Accessed October 2025]

Geological Survey of Ireland (GSI) (n.d.) Spatial Resources. Available from: https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228 [Accessed October 2025]

Gilbert, G., Gibbons, D. W., & Evans, J. (1998). Bird Monitoring Methods: a manual of techniques for key UK species.

Gilbert G., Stanbury A. & Lewis L. (2021). Birds of Conservation Concern in Ireland 4: 2020–2026. *Irish Birds* 43: 1-22.

Gillings, S., Fuller, R. J., & Sutherland, W. J. (2005). Diurnal Studies do not Predict Nocturnal Habitat Choice and Site Selection of European Golden-Plovers (*Pluvialis Apricaria*) and Northern Lapwings (*Vanellus Vanellus*). *The Auk*, *122*(4), 1249-1260.

Goodship, N.M. & Furness, R. (2022). Disturbance distances review: An updated literature review of disturbance distances of selected bird species.

Gorke, M., & Brandl, R. (1986). How to live in colonies: spatial foraging strategies of the black-headed gull. *Oecologia*, *70*(2), 288-290.

Government of Ireland (2018a). National Planning Framework - Project Ireland 2040. Available from: https://cdn.npf.ie/wp-content/uploads/Project-Ireland-2040-NPF.pdf [Accessed October 2025]

Government of Ireland (2019). National Planning Framework. Available from: https://cdn.npf.ie/wp-content/uploads/Project-Ireland-2040-NPF.pdf [Accessed October 2025]

Government of Ireland (2021). National Development Plan 2021-2023. Available from: https://www.gov.ie/en/publication/774e2-national-development-plan-2021-2030/ [Accessed October 2025]

Hanson, B.N. (1979). Studies of three cylindrical profile-wire screens mounted parallel to flow direction. Passive Intake Screens Workshop, Chicago, Illinois, December 1979. Johnson Division UOP Inc., Surface Water Screen Department, New Brighton, Minnesota, USA:97-107.

Hardisty, M. W. (1969). Information on the growth of the ammocoete larva of the anadromous sea lamprey, Petromyzon marinus in British rivers. *Journal of Zoology*, *159*(2), 139-144.

Hardey, J., Crick, H., Riley, H., Etheridge, B., Thompson, D., Scottish Raptor Monitoring Group & Scottish Natural Heritage (2013). Raptors: a field guide to survey and monitoring. The Stationery Office. Third Edition.

Harvey, A. C., Glover, K. A., Wennevik, V., & Skaala, Ø. (2020). Atlantic salmon and sea trout display synchronised smolt migration relative to linked environmental cues. *Scientific reports*, 10(1), 1-13.

Haury, J., Bagliniere, J. L., Cassou, A. I., & Maisse, G. (1995). Analysis of spatial and semporal organization in a salmonid brook in relation to physical factors and macrophytic vegetation. *Hydrobiologia*, *300*(1), 269-277.

Heggenes, J. (1990). Habitat utilization and preferences in juvenile Atlantic salmon (*Salmo salar*) in streams. *River Research and Applications*, *5*(4), 341-354.

Hockin, D., Ounsted, M., Gorman, M., Hill, D., Keller, V., & Barker, M. A. (1991). Examination of the effects of disturbance on birds with reference to its importance in ecological assessments. *Journal of Environmental Management*, 36(4), 253-286.

Igoe, F., Quigley, D., Marnell, F., Meskell, E., O'Connor, W., & Byrne, C. (2004). The Sea Lamprey *Petromyzon marinus* (L.), River Lamprey *Lampetra fluviatilis* (L.) and Brook Lamprey *Lampetra planeri* (Bloch) in Ireland: General Biology, Ecology, Distribution and Status with Recommendations for Conservation. *Biology and Environment: Proceedings of the Royal Irish Academy, 104B*(3), 43-56. Available from: www.jstor.org/stable/20500224 [Accessed October 2025]

Inland Fisheries Ireland (IFI) (2010). Biosecurity Protocol for Field Survey Work. Available from: https://www.fisheriesireland.ie/documents/73-biosecurity-protocol-for-field-survey-work-1/file.html [Accessed October 2025].

Inland Fisheries Ireland (IFI) (2016). Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters.

Institute of Air Quality Management (IAQM) (2024). Guidance on the assessment of dust from demolition and construction. January 2024 (Version 2.2). Available from: https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf [Accessed October 2025]

Irish Climate Analysis and Research Units (ICARUS) (2020). Identification of climate sensitive catchments: Water Resources and Climate Change Adaptation. Produced for Irish Water. Available from: https://www.water.ie/sites/default/files/2024-09/CRU-Report-Identification-of-Climate-Sensitive-Catchments-Water-Reso....pdf [Accessed October 2025]

Irish Water (2015a). Irish Water Business Plan – Transforming Water Services in Ireland to 2021. Available from: https://www.water.ie/sites/default/files/docs/Irish-Water-Business-Plan.pdf [Accessed October 2025]

Irish Water (2015b). Water Services Strategic Plan – A Plan for the Future of Water Services. Available from: https://www.water.ie/sites/default/files/docs/WSSP_Final.pdf [Accessed October 2025]

Irish Water (2017). Design Specification: Treatment of Water Treatment Plant Residuals Document No: IW-TEC-900-07. Available from: https://www.water.ie/sites/default/files/iwstandards/IW-TEC-900-07.pdf [Accessed October 2025]

Irish Water (2021). National Water Resources Plan – Framework Plan. Irish Water's 25 Year Plan for Our Water Assets. Spring 2021. Available from: https://www.water.ie/sites/default/files/projects/strategic-plans/national-water-resources/2.-NWRP-Framework-Plan_For-Final-Adoption_2021_05_25.pdf [Accessed October 2025]

Jacobs TOBIN (2015a). Water Supply Project Eastern and Midlands Region Water Supply Options Working Paper. On behalf of Uisce Éireann, June 2015. Available from: https://www.water.ie/sites/default/files/projects/national-projects/water-supply-project-east-1/publications/Water-Supply-Options-Working-Paper-Non-Technical-Summary.pdf [Accessed October 2025]

Jacobs TOBIN (2015b). Water Supply Project Eastern and Midlands Region Preliminary Options Appraisal Report. On behalf of Uisce Éireann, November 2015. Available from: https://www.water.ie/sites/default/files/projects/national-projects/water-supply-project-east-1/publications/Preliminary-Options-Appraisal-Report-Non-Technical-Summary-November-2015.pdf [Accessed October 2025]

Jacobs TOBIN (2016). Water Supply Project Final Options Appraisal Report: The Preferred Scheme. On behalf of Uisce Éireann, 2016. Available from: https://www.water.ie/sites/default/files/projects/national-projects/water-supply-project-east-1/publications/Final-Option-Appraisal-Report-Non-Technical-Summary-November-2016.pdf [Accessed October 2025]

Kelly, F.L., Connor, L., McLoone, P., Morrissey, E., Kelly, K., Delanty, K., Coyne, J., Corcoran, W., Cierpial, D., Matson, R., Gordon, P., O' Briain, R., Rocks, K., O' Reilly, S., Puttharee, D., McWeeney, D., Robson S. and Buckley, S. (2017a). *Fish Stock Survey of Parteen Basin, June 2016.* National Research Survey Programme, Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

Kelly, F.L., Connor, L., Morrissey, E., McLoone, P., Kelly, K., Delanty, K., Coyne, J., Corcoran, W., Cierpial, D., Matson, R., Gordon, P., O' Briain, R., Rocks, K., O' Reilly, S., Puttharee, D., McWeeney, D., Robson, S. and Buckley, S. (2017b). *Fish Stock Survey of Lough Derg, June 2016*. National Research Survey Programme, Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

Kelly-Quinn, M., & Reynolds, J. (2020). Ireland's Rivers. Published by University College Dublin Press.

Kildare County Council (2022). Kildare County Development Plan, 2023-2029. https://kildarecoco.ie/AllServices/Planning/DevelopmentPlans/KildareCountyDevelopmentPlan2023-2029/

Kilroy, G., Ryan, J., Coxon, C., & Daly, D. A. (2008). A Framework for the Assessment of Groundwater-Dependent Terrestrial Ecosystems under the Water Framework Directive. Environmental Research Centre.

King, J. J., & Linnane, S. M. (2004). *The status and distribution of lamprey and shad in the Slaney and Munster Blackwater SACs*. National Parks and Wildlife Service.

Kurz, I., & Costello, M. J. (1999). *An outline of the biology, distribution and conservation of lampreys in Ireland*. Dúchas.

Laois County Council (2022). Laois County Development Plan 2021-2027. Available from: https://laois.ie/departments/planning/review-of-laois-county-development-plan-2017-2023-2/ [Accessed October 2025]

Legagneux, P., Blaize, C., Latraube, F., Gautier, J., & Bretagnolle, V. (2009). Variation in home-range size and movements of wintering dabbling ducks. Journal of Ornithology, 150(1), 183-193.

Limerick City and County Council (2022). Limerick County Development Plan 2022-2028. Available from: https://www.limerick.ie/council/services/planning-and-placemaking/development-plan-strategies/limerick-development-plan-0 [Accessed October 2025]

Lloyd, C., Tasker, M. L., & Partridge, K. (2010). *The status of seabirds in Britain and Ireland*. A&C Black.

Lockhart, N., Hodgetts, N. and Holyoak, D. (2012). *Rare and threatened Bryophytes of Ireland*. National Museums Northern Ireland Publication No. 028, Holywood, Co. Down.

Lyons, M.D., & Kelly, D.L. (2016). Monitoring Guidelines for the Assessment of Petrifying Springs in Ireland. Irish Wildlife Manuals, No. 94. National Parks and Wildlife Service. Available from: https://www.npws.ie/sites/default/files/publications/pdf/IWM94.pdf [Accessed October 2025]

Madders, M. (2004). The ecology of hen harriers in Scotland in relation to windfarms. *Penbreck and Carmacoup proposed windfarm*.

Maitland, P. S. (2003). Ecology of the river, brook, and sea lamprey. Conserving Natura 2000 Rivers Monitoring Series No. 5. *English Nature, Peterborough*, *52*.

Marine Institute (2020). Salmon Life Cycle. Available from: https://www.marine.ie/Home/site-area/areas-activity/fisheries-ecosystems/salmon-life-cycle#:~:text=to%20the%20ocean.-,Smolt,of%20the%20North%20Atlantic%20Ocean [Accessed October 2025]

Marnell, F., Kelleher, C. & Mullen, E. (2022). Bat mitigation guidelines for Ireland v2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland (Version 1: Kelleher & Marnell, 2006).

McCorry, M., & Ryle, T. (2009). Saltmarsh Monitoring Project 2007-2008. Final Report. Research Branch, National Parks and Wildlife Service. Available from: https://www.npws.ie/sites/default/files/publications/pdf/McCorry_%26_Ryle_2009_Saltmarsh_survey_V1.pdf [Accessed October 2025]

Minchin, D., Lucy, F., & Sullivan, M. (2002). Zebra mussel: impacts and spread. In Invasive aquatic species of Europe. Distribution, impacts and management (pp. 135-146). Springer Netherlands.

Minchin, D., & Boelens, R. (2011). The distribution and expansion of ornamental plants on the Shannon Navigation. In Biology and Environment: Proceedings of the Royal Irish Academy (pp. 195-203). Royal Irish Academy.

Minchin, D. (2014). The distribution of the Asian clam Corbicula fluminea and its potential to spread in Ireland. Management of Biological Invasions, 5(2), 165-177.

Minchin, D. (2016). The Zebra Mussel in the Parteen Reservoir and Lower Lough Derg. A Report to Irish Water and Waterways Ireland. Lough Derg Science Group. 24th July 2016. Report Reference MOI 121/2016.

Minchin, D. & Boelens, R. (2017). Zebra Mussel Larval Abundance Above the Parteen Reservoir During 2017. A Report to Irish Water. Lough Derg Science Group. 26th November 2017. Report Reference MOI 122/2017.

Moorkens, E.A. & Killeen, I.J. (2011). Monitoring and Condition Assessment of Populations of *Vertigo geyeri, Vertigo angustior* and *Vertigo moulinsiana* in Ireland. Irish Wildlife Manuals, No. 55. National Parks and Wildlife Service, Department of Arts, Heritage and Gaeltacht, Dublin, Ireland.

National Biodiversity Data Centre (NBDC) (2019). Press Release issued by Department of Culture, Heritage and the Gaeltacht 20/05/19. Available from: https://biodiversityireland.ie/npws-calls-for-public-support-in-dealing-with-invasive-species-and-disease/ [Accessed October 2025]

National Biodiversity Data Centre (NBDC) (2025). National Biodiversity Data Centre Mapping System. Available from: https://maps.biodiversityireland.ie/Map [Accessed October 2025]

National Parks and Wildlife Services (NPWS) (1998-2019). Irish Wildlife Manuals. Available from: https://www.npws.ie/publications/irish-wildlife-manuals [Accessed October 2025]

National Parks and Wildlife Service (NPWS) (2009). Threat Response Plan: Otter (2009-2011). National Parks & Wildlife Service, Department of the Environment, Heritage & Local Government, Dublin.

National Parks and Wildlife Services (NPWS) (2012a). Conservation Objectives: Lower River Shannon SAC 002165. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf [Accessed October 2025]

National Parks and Wildlife Services (NPWS) (2012b). Conservation Objectives: River Shannon and River Fergus Estuaries SPA 004077. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf [Accessed October 2025]

National Parks and Wildlife Services (NPWS) (2012c). Conservation Objectives Supporting Document – water courses of plain to montane levels with the *Ranuculion fluitantis* and *Callitricho-Batrachion.* Version 1. Available from: https://www.npws.ie/sites/default/files/publications/pdf/002165_Lower%20River%20Shannon%20SAC%20Water%20Courses%20Supporting%20Doc_V1.pdf [Accessed October 2025].

National Parks and Wildlife Services (NPWS) (2015). Conservation Objectives: Sharavogue Bog SAC 000585. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000585.pdf [Accessed October 2025]

National Parks and Wildlife Services (NPWS) (2019a). The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished NPWS report. Available from: https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf [Accessed October 2025]

National Parks and Wildlife Services (NPWS) (2019b). The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report. Available from: https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol2_Habitats_Article17.pdf [Accessed October 2025]

National Parks and Wildlife Services (NPWS) (2019c). The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessments. Unpublished NPWS report. Available from: https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol3_Species_Article17.pdf [Accessed October 2025]

National Parks and Wildlife Services (NPWS) (2019d). Conservation Objectives: Lisduff Fen SAC 002147. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002147.pdf [Accessed October 2025]

National Parks and Wildlife Services (NPWS) (2019e). Conservation Objectives: Lough Derg, North-east Shore SAC 002241. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002241.pdf [Accessed October 2025]

National Parks and Wildlife Services (NPWS) (2021a). Conservation Objectives: Rye Water Valley/Carton SAC 001398. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001398.pdf [Accessed October 2025]

National Parks and Wildlife Services (NPWS) (2021b) Conservation Objectives: Charleville Wood SAC 000571. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000571.pdf [Accessed October 2025]

National Parks and Wildlife Services (NPWS) (2021c) Conservation Objectives: River Boyne and River Blackwater SAC 002299. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002299.pdf [Accessed October 2025]

National Parks and Wildlife Services (NPWS) (2022a) Conservation Objectives: River Shannon Callows SAC 000216. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000216.pdf [Accessed October 2025]

National Parks and Wildlife Services (NPWS) (2022b) Conservation Objectives: Slievefelim to Silvermines Mountains SPA 004165. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004165.pdf [Accessed October 2025]

National Parks and Wildlife Services (NPWS) (2022c). Conservation Objectives: Slieve Bloom Mountains SPA 004160. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004160.pdf [Accessed October 2025]

National Parks and Wildlife Services (NPWS) (2022d). Conservation Objectives: Slieve Aughty Mountains SPA 004168. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004168.pdf [Accessed October 2025]

National Parks and Wildlife Services (NPWS) (2022e). Conservation Objectives: Middle Shannon Callows SPA 004096. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004096.pdf [Accessed October 2025]

National Parks and Wildlife Services (NPWS) (2024a). Conservation Objectives: Lough Derg (Shannon) SPA 004058. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004058.pdf [Accessed October 2025]

National Parks and Wildlife Services (NPWS 2024b). Conservation Objectives: River Boyne and River Blackwater SPA 004232. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004232.pdf [Accessed October 2025]

National Parks and Wildlife Services (NPWS 2024c). Conservation Objectives: Poulaphouca Reservoir SPA 004063. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004063.pdf [Accessed October 2025]

National Parks and Wildlife Service (NPWS 2024d). Corncrake/Traonach Conservation Programme Bird Survey and Habitat Management Report 2024. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Available from: https://www.npws.ie/sites/default/files/publications/pdf/npws-ctcp-2024-bird-survey-and-habitat-mgmt-report.pdf [Accessed October 2025]

National Parks and Wildlife Service (NPWS) (2025a). Protected sites. Available from: https://www.npws.ie/protected-sites [Accessed October 2025]

National Parks and Wildlife Service (NPWS) (2025b). National Parks and Wildlife Service Maps and Data. Available from: www.npws.ie/maps-and-data [Accessed October 2025]

National Parks and Wildlife Service (2025c) Conservation Objectives: River Barrow and River Nore SAC 002162. Version 2. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002162.pdf [Accessed October 2025]

National Parks and Wildlife Service (NPWS) (2025d) Conservation Objectives: Dovegrove Callows SPA 004137. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004137.pdf [Accessed October 2025]

National Parks and Wildlife Service (NPWS) (2025e) Conservation Objectives: River Little Brosna Callows SPA 004086. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Available from: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004086.pdf [Accessed October 2025]

National Roads Authority (NRA) (2005). Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes. Available from: https://www.tii.ie/media/jtjh4j1b/guidelines-for-the-crossing-of-watercourses-during-the-construction-of-national-road-schemes.pdf [Accessed October 2025]

National Roads Authority (NRA) (2008a). Guidelines on the Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. Available from: http://www.tii.ie/technical-services/environment/planning/Guidelines-on-Procedures-for-Assessment-and-Treatment-of-Geology-Hydrology-and-Hydrogeology-for-National-Road-Schemes.pdf [Accessed October 2025]

National Roads Authority (NRA) (2008b). Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes. Available from: http://www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Treatment-of-Otters-prior-to-the-Construction-of-National-Road-Schemes.pdf [Accessed October 2025]

National Roads Authority (NRA) (2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. Available from: https://www.tii.ie/media/4nthqz3a/ecological-

surveying-techniques-for-protected-flora-and-fauna-during-the-planning-of-national-road-schemes.pdf. [Accessed October 2025]

National Roads Authority (NRA) (2010). Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads. Available from: https://www.tii.ie/media/rtmi2ebi/management-of-noxious-weeds-and-non-native-invasive-plant-species-on-national-road-schemes.pdf [Accessed October 2025]

National Roads Authority (NRA) (2014a). Drainage Design for National Road Schemes - Sustainable Drainage Options. Available from: https://www.tiipublications.ie/downloads/SRM/1-Drainage-design-for-national-road-schemes-May-2014.pdf [Accessed October 2025]

National Roads Authority (NRA) (2014b). Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes. Available from: https://www.tii.ie/media/xf0nu3ub/good_practice_guidance_for_the_treatment_of_noise_during_the_planning_of_national_road_schemes.pdf [Accessed October 2025]

National Roads Authority (NRA) (2014c) Guidelines for the Management of Waste from National Road Construction Projects. Available from: https://www.tii.ie/media/h3gl4sxt/management-of-waste-from-national-road-construction-projects.pdf [Accessed October 2025]

National University of Ireland (NUI) Maynooth (2008). Climate Change-Refining the Impacts for Ireland (2001-CD-C3-M1). Prepared for the Environmental Protection Agency. Available from: https://www.epa.ie/publications/research/climate-change/sweeney-report-strive-12-for-web-low-res.pdf [Accessed October 2025]

Natural Resources Wales (2020). Hydropower Guidance Note: HGN 9 Fish Screening. Available from: https://naturalresources.wales/media/2584/hydropower-guidance-note-hgn-9-fish-screening.pdf [Accessed October 2025]

Noonan, M., Grant, J., and Jackson, C. (2011). A quantitative assessment of fish passage efficiency. Fish and Fisheries, Volume 13, Issue 4, p. 450-464.

Northern and Western Regional Assembly (2020). Regional Spatial and Economic Strategy for the North and West Region. Available from: https://www.nwra.ie/pdfs/NWRA-RSES-2020-2032.pdf [Accessed October 2025]

Northern Ireland Environment Agency (2009). River Hydromorphology Assessment Technique (RHAT). Training Guide (2009). Available from: http://www.epa.ie/wfdstatus/rivers/RW_RHAT_training_guide_final_20_04_09.pdf [Accessed October 2025]

O'Brien, M., & Smith, K. (1992). Changes in the status of waders breeding on wet lowland grasslands in England and Wales between 1982 and 1989. *Bird Study*, *39*(3), 165-176.

O'Connor, Á. (2015). *Habitats Directive Annex I lake habitats: a working interpretation for the purposes of site-specific conservation objectives and Article 17 reporting*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

O'Donoghue, B.G. (2019). Hen Harrier Roost Types and Guidelines to Roost Watching. Available from: http://www.ihhws.ie/IHHWS_Guide.pdf. [Accessed October 2025]

O'Donoghue, B. G. (2020) 'Hen Harrier *Circus cyaneus* ecology and conservation during the non-breeding season in Ireland', *Bird Study*, 67(3), pp. 344–359. doi: 10.1080/00063657.2021.1874871.

Offaly County Council (2021). Offaly County Development Plan 2021-2027. Available from: https://www.offaly.ie/c/county-development-plan/ [Accessed October 2025]

O'Grady, M.F. (2006). Channels & Challenges. Enhancing Salmonid Rivers. Irish Freshwater Fisheries Ecology & Management Series: Number 4, Central Fisheries Board. Dublin, Ireland.

O'Neill, F. H., Martin, J. R., Devaney, F. M., & Perrin, P. M. (2013). *The Irish semi-natural grasslands survey 2007-2012*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Office of Public Works (OPW) (2011). The Office of Public Works Arterial Drainage Maintenance Environmental Management Protocols and Standard Operating Procedures. Available from: www.fisheriesireland.ie/sites/default/files/migrated/docman/OPW%20Environmental%20Management%20Protocols%20%26%20SOPs%20April%202011.pdf [Accessed October 2025]

Office of Public Works (OPW) (2019). Flood Risk Management: Climate Change Sectoral Adaptation Plan.

Office of Public Works (OPW) (2021). Section 50 Consents – Consent Requirements – Construction/Alteration of Watercourse Infrastructure. Available from: https://www.gov.ie/en/policy-information/292d9-section-50-consents-consent-requirements-constructionalteration-of-watercourse-infrastructure/ [Access June 2025]

Office of Public Works (OPW) (2024). Hydro-Data - flow records. Available from: https://waterlevel.ie/hydro-data/#/overview/Waterlevel [Accessed October 2025]

Parnell, J., Curtis, T., & Cullen, E. (2012). Webb's An Irish Flora. Cork University Press.

Pedroso, N. M., Marques, T. A., & Santos-Reis, M. (2014). The response of otters to environmental changes imposed by the construction of large dams. *Aquatic Conservation: Marine and Freshwater Ecosystems*, *24*(1), 66-80.

Perrin, P., Martin, M., Barron, S., O'Neill, F., McNutt, K, & Delaney, A. (2008). National Survey of Native Woodlands 2003-2008. Volume 1: Main Report. Submitted to the National Parks and Wildlife Service. Available from: https://www.npws.ie/sites/default/files/general/nsnw-vol-1.pdf [Accessed October 2025]

Peterson, R. H. (1978). Physical characteristics of Atlantic spawning salmon gravel in some New Brunswick streams. *Fisheries and Marine Service Technical Report*, *785*.

Petty, S. J. (1996). Reducing disturbance to goshawks during the breeding season. *Research Information Note-Forestry Authority Research Division* (United Kingdom). no. 267.

Popper A.N., Hawkins A. D., Fay R.R., Mann D.A., Bartol S., Carlson T.J., Coombs S., Ellison W.T., Gentry M.B., Løkkeborg S., Rogers P.H., Southall B.L., Zeddies D.G., Tavolga W.N. (2014). Sound exposure guidelines for fishes and sea turtles. Springer Briefs in Oceanography. DOI 10. 1007/978-3-319-06659-2.

Preston, C.D., Pearman, A. & Dines, T.D. (2002). New atlas of the British and Irish flora. Oxford University Press.

Reid, N., Hayden, B., Lundy, M.G., Pietravalle, S., McDonald, R.A. & Montgomery, W.I. (2013). National Otter Survey of Ireland 2010/12. Irish Wildlife Manuals No. 76. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Rose, F. (1989). Colour identification guide to the grasses, sedges, rushes and ferns of the British Isles and north-western Europe. London: Viking 240p.-illus., col. illus. ISBN, 670806889.

RPS Consulting Engineers (2008a) Strategic Environmental Assessment (SEA) Environmental Report for the Water Supply Project - Dublin Region

RPS Consulting Engineers (2008b). Water Supply Project – Dublin Region (Draft Plan). Habitats Directive Assessment. On behalf of Dublin City Council. MDE0599Rp0009. F01.

RAAK-PRO (2017). The colonization by seaweed and fauna of different revetment types at Sint-Annaland, Tholen. RAAK-POR Building for Nature. Final report. October 2017.

Ruddock, M., & Whitfield, D. P. (2007). A review of disturbance distances in selected bird species. *A report from Natural Research (Projects) Ltd to Scottish Natural Heritage*, 181.

Ruddock, M., Mee, A., Lusby, J., Nagle, A., O'Neill, S. & O'Toole, L. (2016). The 2015 National Survey of Breeding Hen Harrier in Ireland. Irish Wildlife Manuals, No. 93. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Ireland.

Schofield, H. (2008). *The Lesser Horseshoe Bat Conservation Handbook*. Herefordshire, England: The Vincent Wildlife Trust.

Scottish Natural Heritage (SNH) (2016). Assessing Connectivity with Special Protection Areas (SPAs). *SNH Guidance. Scottish Natural Heritage, Version 3 – June 2016*. Available from: https://www.nature.scot/sites/default/files/2017-06/A2015314%20-%20Assessing%20connectivity%20with%20special%20protection%20areas%20-June%202016.pdf [Accessed October 2025]

Scottish Natural Heritage (SNH) (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. SNH Guidance. Scottish Natural Heritage, Battleby. Available from: https://www.nature.scot/sites/default/files/2018-06/Guidance%20Note%20-%20Recommended%20bird%20survey%20methods%20to%20inform%20impact%20assessment%20of%20onshore%20windfarms.pdf [Accessed October 2025]

Smith, G.F., O'Donohue, P., O'Hora, K., and Delaney, E. (2011). Best Practice Guidance for Habitat Survey and Mapping. The Heritage Council. Available from: https://www.heritagecouncil.ie/content/files/best_practice_guidance_habitat_survey_mapping_onscreen_version_2011_8mb.pdf [Accessed October 2025]

South Dublin County Council (2022). South Dublin County Council Development Plan 2022-2028. Available from: https://www.sdcc.ie/en/services/planning/development-plan/plan-2022-2028/

Southern Regional Assembly (2020). Regional Spatial and Economic Strategy for the Southern Region. Available from: https://www.southernassembly.ie/regional-planning/rses

Stace, C. (2019). New flora of the British Isles. Fourth Edition. Cambridge university press.

Symons, P. E. K., & Heland, M. (1978). Stream habitats and behavioral interactions of underyearling and yearling Atlantic salmon (*Salmo salar*). *Journal of the Fisheries Board of Canada*, *35*(2), 175-183.

Taft, E. P. (1993). *An Update of Methods for Preventing Turbine mortality at hydro projects* (No. FO/S--97-6-1905E).

Teagasc (2003). Soils of County Offaly. Available from: https://www.offalyhistory.com/wp-content/uploads/2017/03/Soils-of-County-Offaly.pdf [Accessed October 2025]

Teagasc (2006). Soils Map of Ireland. Produced as part of the EPA/Teagasc Soils and Subsoils Mapping Project, Teagasc, Kinsealy, Dublin.

Thaxter, C., Lascelles, B., Sugar, K., Cook, A., Roos, S., Bolton, M., Langston, R. and Bolton, M. 2012. Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. *Biological Conservation 156 (2012)* 53-61.

Therrien, J. and Bourgeois, G. (2000). *Fish passage at small hydro sites*. International Energy Agency.

Tipperary County Council (2022). Tipperary County Development Plan, 2022-2028. https://www.tipperarycoco.ie/planning-and-building/development-plan-consultation/tipperary-county-development-plan-2022-2028

Toner, P., Bowman, K., Clabby, K., Lucey, J., McGarrigle, M, Concannon, C., Clenaghan, C., Cunningham, P., Delaney, J., O' Boyle, S., MaCarthaigh, M., Craig, M., and Quinn, R. (2005). Water Quality in Ireland 2001-2003. Environmental Protection Agency, Wexford.

Transport Infrastructure Ireland (TII) (2017). The Management of Waste from National Road Construction Projects. GE-ENV-01101. Available from: https://www.tii.ie/media/xnolfrs0/ge-env-01101-01.pdf. [Accessed: June 2025]

Transport Infrastructure Ireland (TII) (2020). The Management of Invasive Alien Plant Species on National Roads – Technical Guidance, GE-ENV-01105. Available from: https://www.tiipublications.ie/library/GE-ENV-01105-01.pdf [Accessed October 2025]

Transport Infrastructure Ireland (TII) (2022). Air Quality Assessment of Proposed National Roads – Standard. PE-ENV-01107 December 2022.

Transport Infrastructure Ireland (TII) (n.d.). Projects & Improvements. Available from: https://www.tii.ie/en/roads-tolling/projects-and-improvements/ [Accessed October 2025]

Turnpenny, A.W.H. and Horsfield, R.A. (2014). International Fish Screening Techniques. WIT Press, Southampton 2014.

Uisce Éireann (2018). AM-SOP-009 Information and Guidance Document on Japanese Knotweed. Irish Water.

Uisce Éireann (n.d.). Our Projects. Available from: https://www.water.ie/projects/ [Accessed October 2025]

UK Environment Agency (2005). Screening for Intakes and Outfalls: a best practice guide. Available from: https://assets.publishing.service.gov.uk/media/5a7c9293ed915d6969f45d2d/scho0205bioc-e-e.pdf [Accessed October 2025]

UK Environment Agency (2009). Good Practice Guidelines Annex the Environment Agency Hydropower Handbook - The Environmental Assessment of Proposed Low Head Hydro Power Developments.

United Kingdom Technical Advisory Group (UKTAG) (2008). United Kingdom Technical Advisory Group on the Water Framework Directive. UK Environmental Standards and Conditions (Phase 1). Final Report, April 2008. SR1-2006.

Wańkowski, J. W. J., & Thorpe, J. E. (1979). Spatial distribution and feeding in Atlantic salmon, *Salmo salar* L. juveniles. *Journal of Fish Biology*, *14*(3), 239-247.

Wetlands International (2022). ‘Waterbird Population Estimates’. Available from: wpe.wetlands.org. [Accessed October 2025]

Wilson, M., Irwin, S., O’Donoghue, B., Kelly, T., & O’Halloran, J. (2010). The use of forested landscapes by Hen Harriers in Ireland. *COFORD: Dublin, Ireland*.

Wright, M. D., Goodman, P., & Cameron, T. C. (2010). Exploring behavioural responses of shorebirds to impulsive noise. *Wildfowl*, *60*(60), 150-167.

11. Appendices

Appendix A – NPWS Data Request Correspondence

Appendix B – NPWS and DEHLG Consultation

Appendix C – SEA Phase 2 HDA Report

Appendix D – DAU Consultation

Appendix E – IFI Consultation

Appendix F – BirdWatch Ireland Consultation

Appendix G – Parteen Basin Annex I Habitat Conformity

Appendix H – Wetland Survey Ireland Parteen Survey

Appendix I – Parteen Woodland Assessment

Appendix J – Watercourse Crossings and Pathways to European Sites

Appendix K – Restore Objectives for the Lower River Shannon SAC

Appendix L – Projects Considered for In-Combination Effects

Tionscadal Soláthair Uisce
Water Supply Project

Natura Impact Statement (NIS)

(Appendix A) NPWS Data Request Correspondence

Document no: 32105801/EIAR/NIS/Appendix A
Version: Final

December 2025

Uisce Éireann
Irish Water

Jacobs

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Laura Kennedy

From: Joanne AllenHamilton
Sent: 08 February 2018 11:33
To: Laura Kennedy
Subject: FW: Data Request
Attachments: 2015_054_additional_files_used_for_Art17.zip; ATT00001.txt; ATT00002.htm

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From: Jochen Roller - (ESRI - DAHG) [mailto:Jochen.Roller@ahg.gov.ie]
Sent: 14 April 2015 10:45
To: Joanne AllenHamilton
Subject: RE: Data Request

Hello Joanne,

Please find additional files that went into production of the Article 17 maps attached.

The habitats and species on your list that don't have data attached are covered by the data I sent to you last week, with the exception of the lampreys and salmon. My colleague is currently looking into these and I'm hoping to be able to send you out data on these by the end of the week or early next week – by then I should have heard back from our Birds Unit as well.

For the freshwater pearl mussel, two catchments just overlap with your area of interest. These are shown in the shapefile of sensitive areas available on http://www.npws.ie/maps-and-data/habitat-and-species-data

Apologies for having to send you information in bits.
Best regards,
Jochen

Jochen Roller
National Parks & Wildlife Service
7 Ely Place, Dublin 2, Ireland
Jochen.Roller@ahg.gov.ie
Tel: +353-1-8883073

From: Joanne AllenHamilton [mailto:Joanne.AllenHamilton@tobin.ie]
Sent: 08 April 2015 09:31
To: Jochen Roller - (ESRI - DAHG)
Subject: RE: Data Request

Hello Jochen,

In addition to the four habitats that are downloadable for Article 17, as requested below is a list of habitats and species for the SAC's I am interested in:

- 5130 *Juniperus communis* formations on heaths or calcareous grasslands
- 7210 Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae**
- 7230 Alkaline fens
- 8240 Limestone pavements*
- 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)*
- 91J0 *Taxus baccata* woods of the British Isles*

- 6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)
- 6510 Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)
- 8240 Limestone pavements*
- Active raised bogs [7110]*
- Degraded raised bogs still capable of natural regeneration [7120]
- Depressions on peat substrates of the Rhynchosporion [7150]
- Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]
- Margaritifera margaritifera (Freshwater Pearl Mussel) [1029]
- Petromyzon marinus (Sea Lamprey) [1095]
- Lampetra planeri (Brook Lamprey) [1096]
- Lampetra fluviatilis (River Lamprey) [1099]
- Salmo salar (Salmon) [1106]
- Lutra lutra (Otter) [1355]

Regarding the SPA's, the main species I am interested in include:

- Cormorant (Phalacrocorax carbo) [A017]
- Tufted Duck (Aythya fuligula) [A061]
- Goldeneye (Bucephala clangula) [A067]
- Common Tern (Sterna hirundo) [A193]
- Whooper Swan (Cygnus cygnus) [A038]
- Wigeon (Anas penelope) [A050]
- Corncrake (Crex crex) [A122]
- Golden Plover (Pluvialis apricaria) [A140]
- Lapwing (Vanellus vanellus) [A142]
- Black-tailed Godwit (Limosa limosa) [A156]
- Black-headed Gull (Chroicocephalus ridibundus) [A179]

Many Thanks
Joanne

From: Jochen Roller - (ESRI - DAHG) [mailto:Jochen.Roller@ahg.gov.ie]
Sent: 07 April 2015 12:50
To: Joanne AllenHamilton
Subject: RE: Data Request

Hello Joanne,

I passed on your query re. bird data to our Birds Unit.

In terms of Article 17 distribution mapping, additional datasets to those I sent out to you might have been used. At the moment Article 17 data for four habitats are available for download from our website via http://www.npws.ie/maps-and-data/habitat-and-species-data/article-17-reporting-data
Maybe you can let me know which habitats / species you are mainly interested in and I will check for any additional datasets.

Thanks,
Jochen

Jochen Roller
National Parks & Wildlife Service
7 Ely Place, Dublin 2, Ireland

Jochen.Roller@ahg.gov.ie
Tel: +353-1-8883073

From: Joanne AllenHamilton [mailto:Joanne.AllenHamilton@tobin.ie]
Sent: 02 April 2015 16:10
To: Jochen Roller - (ESRI - DAHG)
Subject: RE: Data Request

Hello Jochen,

Thank you for sending through the data.
Can you confirm if the data you sent includes all data used for the production of the Article 17 reports? If not can this data be made available?

Also I note there is no data on bird species, can you please advise me if you have any data available inhouse (rather than from BWI) on what areas are used for breeding/feeding by qualifying interests species of the SPA's.

I was hoping to catch you on the phone to discuss but I will try again next week.

Happy Easter
Joanne

From: Jochen Roller - (ESRI - DAHG) [mailto:Jochen.Roller@ahg.gov.ie]
Sent: 31 March 2015 17:36
To: Joanne AllenHamilton
Subject: RE: Data Request

Hello Joanne,

Please find requested data attached.

Only one of the sites, Kilcarren-Firville Bog cSAC 000647, currently has a Conservation Plan which is available for download from http://www.npws.ie/protected-sites/conservation-planning/available-plans

There are also Site Specific Conservation Objectives available for the Lower River Shannon cSAC 002165 which can be accessed via the Protected Sites section on our website. For any GIS data that went into the Site Specific Conservation Objectives please see http://www.npws.ie/maps-and-data/habitat-and-species-data

Can I refer you to the Protected Sites section on our website for any other information on the designated sites. Another source of information which you might find useful are the 2013 Article 17 Conservation Assessments. These are available on http://www.npws.ie/publications/article-17-reports

Just to reiterate, as per the data policy, our datasets are not complete or perfect in terms of quality, so it is important to note that the absence of information in the NPWS dataset for an area, does not necessarily imply a low biodiversity value for that area. These data should not be seen as a replacement for field surveys.

Please note that the NPWS species dataset is incomplete, particularly for fish, bats and birds, so please don't be surprised if species listed on the site synopsis do not appear in the dataset. Can I also remind you that locations for sensitive species should not be made publicly available.

The list of what qualifies as a rare or threatened species is available at http://www.npws.ie/mapsanddata/requestdata/ . It covers species listed one or more of the following documents: EU Directives (Birds & Habitats), Wildlife Act, 1976 & Wildlife (Amendment) Act, 2000, Flora (Protection) Order 1999 or Published National Red Lists. This list is regularly updated, as new legislation is added, or red lists are published, so it is worth checking back to the version available on the NPWS website regularly.

Inland Fisheries Ireland, BirdWatch Ireland, Bat Conservation Ireland and the National Biodiversity Data Centre may have additional records of use.

Best regards,
Jochen

Jochen Roller
National Parks & Wildlife Service
7 Ely Place, Dublin 2, Ireland
Jochen.Roller@ahg.gov.ie
Tel: +353-1-8883073

From: Joanne AllenHamilton [mailto:Joanne.AllenHamilton@tobin.ie]
Sent: 27 March 2015 10:43
To: Jochen Roller - (ESRI - DAHG)
Cc: natureconservation@ahg.gov.ie
Subject: Data Request

Hello Jochen,

Please find attached a data request for information on Lough Derg and Parteen Basin and their surrounding areas. If I can provide further clarification or information please don't hesitate to contact me.

I would be grateful if you could indicate roughly when you would be able to provide this information.

Kind Regards

Joanne Allen-Hamilton M.Sc, B.Sc, MCIEEM
Senior Ecologist

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Laura Kennedy

From: Joanne AllenHamilton
Sent: 29 January 2016 14:52
To: 'Jochen.Roller@ahg.gov.ie'
Cc: 'nature.conservation@ahg.gov.ie'
Subject: Data Request - 2km corridor for Water Supply Project-Eastern & Midlands Region
Attachments: Data request form_2km corridor_January2016.pdf; Reduced size 2km maps.pdf

Jochen,

Please find attached a data request for information on a proposed development in Water Supply Project – Eastern and Midlands Region.

I realise this covers an extensive area so if I can provide further clarification or information please don't hesitate to contact me.

Kind Regards

Joanne Allen-Hamilton M.Sc, B.Sc, MCIEEM
Senior Ecologist

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Laura Kennedy

From: Joanne AllenHamilton
Sent: 02 January 2018 09:20
To: Laura Kennedy
Subject: FW: Data Request for Water Supply Project

Hi Laura and a very Happy New Year,

See below response from NPWS re the data query I sent in December.

Joanne

From: Jochen Roller [mailto:Jochen.Roller@chg.gov.ie]
Sent: 18 December 2017 15:24
To: Joanne AllenHamilton
Subject: RE: Data Request for Water Supply Project

Hello Joanne,

I checked our current data holdings against the files that I sent out to you on 01/02/2016. The only updated information for (parts of) your area of interest is held in the Site specific Conservation Objectives shapefiles for SACs, which are available for download from https://www.npws.ie/maps-and-data/habitat-and-species-data

The Article 17 (EU Habitats Directive) reporting data for the current reporting cycle are due to be submitted in spring 2019, and as a result updated information on Annex Habitats and species are expected to be available by then.

With best regards,
Jochen

Jochen Roller | National Parks & Wildlife Service | 7 Ely Place, Dublin 2, Ireland | D02 TW98 | Jochen.Roller@chg.gov.ie | Tel: +353-1-8883073

From: Joanne AllenHamilton [mailto:Joanne.AllenHamilton@tobin.ie]
Sent: 13 December 2017 15:24
To: Jochen Roller
Cc: Laura Kennedy
Subject: FW: Data Request for Water Supply Project

Hello Jochen,

I tried to email you yesterday (see below) but the attachments were too large.

I contacted yourself in 2015 and 2016 regarding the Water Supply Project Eastern and Midlands Region and you responded with various information on 22/09/15, 04/11/15, and 01/02/16.

If at all possible, I would be grateful if you could advise on whether any more recent baseline data/information has been made available and which we could source from yourselves?

Both myself and my colleague Laura is available to discuss the data request, please do not hesitate to contact us.

Kind Regards
Joanne

From: Joanne AllenHamilton
Sent: 12 December 2017 16:01
To: 'jochen.roller@chg.gov.ie'
Cc: Laura Kennedy
Subject: Data Request for Water Supply Project

Hello Jochen,

I previously contacted you requesting data for the Water Supply Project Eastern and Midlands Region (please see attached email including emails with the information you sent me).

If at all possible, I would be grateful if you could advise on whether any more recent baseline data/information has been made available and which we could source from yourselves?

Both myself and my colleague Laura is available to discuss the data request, please do not hesitate to contact us.

Kind Regards
Joanne

Joanne Allen-Hamilton BSc (Hons), MSc.,
Senior Ecologist – Energy and Environment

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Is faoi rún agus chun úsáide an té nó an aonán atá luaite leis, a sheoltar an ríomhphost seo agus aon comhad atá nasctha leis. Má bhfuair tú an ríomhphost seo trí earráid, déan teagmháil le bhainisteoir an chórais.

Laura Kennedy

From: Jochen Roller <Jochen.Roller@chg.gov.ie>
Sent: 29 November 2018 15:42
To: Laura Kennedy
Subject: RE: INFORMATION REQUEST | Freshwater Pearl Mussel - River Barrow
Attachments: Margaritifera_GIS_subset_Barrow.zip

Hi Laura,

Please find *Margaritifera* GIS data for the Barrow catchment attached, along with metadata.

Can I just remind you of the sensitivity of *Margaritifera* data owing to the on-going risk of pearl fishing and other deliberate damage. Consequently, these data should not be made available to the public, either electronically or in hard copy, in a format (e.g. as a large scale map) that could readily be used to locate mussels.

GIS files for our catchment based *Margaritifera* sensitive areas map can be downloaded from https://www.npws.ie/maps-and-data/habitat-and-species-data

With best regards,
Jochen

Jochen Roller | National Parks & Wildlife Service | 90 North King Street, Arran Quay, Dublin 7, D07 N7CV
Jochen.Roller@chg.gov.ie | Tel: +353-1-8883073

From: Laura Kennedy [mailto:Laura.Kennedy@tobin.ie]
Sent: 15 November 2018 14:38
To: Jochen Roller; Nature Conservation
Subject: INFORMATION REQUEST | Freshwater Pearl Mussel - River Barrow

Hi Jochen,

I was wondering if you could provide me with information (shapefiles) on the locations of Freshwater Pearl Mussel (*Margaritifera margaritifera* and *Margaritifera durrovensis*) within the River Barrow catchment?

I have attached a data request form for the same.

Regards,

Laura

Laura Kennedy, B.Sc., M.Sc.
Project Ecologist/Project Manager

Telephone: +353 (0) 1 8030401
Mobile: +353 (0) 86 1591521
Email: Laura.Kennedy@tobin.ie
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Laura Kennedy

From: Jochen Roller <Jochen.Roller@chg.gov.ie>
Sent: 03 July 2019 16:49
To: Laura Kennedy
Subject: RE: Information Request
Attachments: Curlew_HenHarrier_Peregrine_10ksquares.xlsx

Hi Laura,

Thanks for filling out the form. Please find spreadsheet with bird data attached.

We extracted any records for an area of 5km around the provided shapefile (divided into three categories: 0-1km; 1-3km; 3-5km) for Curlews, Hen harriers and Peregrine falcons. Please find records listed by 10km square attached.

- Curlew (CU)
  - records are for breeding pairs; year of record given
- Hen harrier (HH)
  - Records are for confirmed breeding sites as well as sightings; year of record given
- Peregrine falcon (PF)
  - Records are for nest sites recorded in the 2017 National Survey

There is no NPWS owned data available on Hen harrier wintering sites for the area of interest.

Just to reiterate, as per the data policy, our datasets are not complete or perfect in terms of quality, so it is important to note that the absence of information in the NPWS dataset for an area, does not necessarily imply a low biodiversity value for that area. These data should not be seen as a replacement for field surveys.

Best regards,
Jochen

Jochen Roller | National Parks & Wildlife Service | 90 North King Street, Arran Quay, Dublin 7, D07 N7CV
Jochen.Roller@chg.gov.ie | Tel: +353-1-8883073

From: Laura Kennedy [mailto:Laura.Kennedy@tobin.ie]
Sent: 02 July 2019 13:05
To: Jochen Roller
Subject: Information Request

Hi Jochen,

Please find attached the completed data request form. I have also attached a shapefile showing the area of interest.

Thanks,

Laura

Laura Kennedy, B.Sc., M.Sc.
Senior Ecologist/Project Manager

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From: Jochen Roller <Jochen.Roller@chg.gov.ie>
Sent: 02 July 2019 09:40
To: Laura Kennedy <Laura.Kennedy@tobin.ie>
Subject: RE: Data Request

Sorry Laura,
form is attached now.
Best wishes,
Jochen

Jochen Roller | National Parks & Wildlife Service | 90 North King Street, Arran Quay, Dublin 7, D07 N7CV
Jochen.Roller@chg.gov.ie | Tel: +353-1-8883073

From: Laura Kennedy [mailto:Laura.Kennedy@tobin.ie]
Sent: 02 July 2019 09:39
To: Jochen Roller
Subject: RE: Data Request

No problem Jochen. Can you send me on the form you need me to complete? It wasn't attached in your last email.

Thanks,

Laura

Laura Kennedy, B.Sc., M.Sc.
Senior Ecologist/Project Manager

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From: Jochen Roller <Jochen.Roller@chg.gov.ie>
Sent: 01 July 2019 16:46
To: Laura Kennedy <Laura.Kennedy@tobin.ie>
Subject: RE: Data Request

Hi Laura,

I just got around looking into your query now, and ran it by our Birds Unit.

Due to the sensitivity of the Curlew data we cannot give out GIS files on exact locations of breeding sites, but if you can get back to us with an area of interest (ideally as a shapefile) we will query our data and report back to you about any records in the vicinity.
Could I also ask you to fill out the attached form please and send it back to myself.

Thanks,
Jochen

Jochen Roller | National Parks & Wildlife Service | 90 North King Street, Arran Quay, Dublin 7, D07 N7CV
Jochen.Roller@chg.gov.ie | Tel: +353-1-8883073

From: Laura Kennedy [mailto:Laura.Kennedy@tobin.ie]
Sent: 18 June 2019 14:45
To: Jochen Roller
Subject: RE: Data Request

Hi Jochen,

I am emailing in relation to the 2018 National Curlew Survey undertaken by the NPWS. I was wondering if it would be possible for the NPWS to share the data (shapefiles) from this survey with TOBIN Consulting Engineers so I can overlay it with the proposed Water Supply Project and use it to inform our environmental assessment?

I was also recently made aware at a consultation meeting with NPWS, that NPWS have data on wintering hen harrier sites (GIS database). Again, I was wondering if it would be possible for you to send me this data?

Thanks,

Laura

Laura Kennedy, B.Sc., M.Sc.
Senior Ecologist/Project Manager

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Mobile: +353 (0) 86 1591521
Email: Laura.Kennedy@tobin.ie
Website: http://www.tobin.ie

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From: Jochen Roller <Jochen.Roller@chg.gov.ie>
Sent: 14 June 2018 12:43
To: Laura Kennedy <Laura.Kennedy@tobin.ie>
Subject: RE: Data Request

Hi Laura,

Sure, please find shapefile attached.

Best regards,
Jochen

Jochen Roller | National Parks & Wildlife Service | 90 North King Street, Arran Quay, Dublin 7, D07 N7CV
Jochen.Roller@chg.gov.ie | Tel: +353-1-8883073

From: Laura Kennedy [mailto:Laura.Kennedy@tobin.ie]
Sent: 13 June 2018 09:48
To: Jochen Roller
Subject: RE: Data Request

Hi Jochen,

I was just wondering if it would be possible for you to send me a shapefile of the 10 km square grids for the country – similar to the one attached but for the whole country?

Thanks,

Laura

Laura Kennedy, B.Sc., M.Sc.
Project Ecologist/Project Manager

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From: Jochen Roller [mailto:Jochen.Roller@chg.gov.ie]
Sent: 07 March 2018 12:32
To: Laura Kennedy
Subject: RE: Data Request

Hi Laura,

Yes, the information on the website is an update on the information in the file that we sent out to you at the time. Thanks for pointing out the discrepancy.
The metadata that comes with the dataset on our website gives information on how the dataset was derived. If you have any specific questions after consulting the metadata please feel free to get back to us again.

Best regards,
Jochen

Jochen Roller | National Parks & Wildlife Service | 7 Ely Place, Dublin 2, Ireland | D02 TW98 | Jochen.Roller@chg.gov.ie | Tel: +353-1-8883073

From: Laura Kennedy [mailto:Laura.Kennedy@tobin.ie]
Sent: 07 March 2018 12:18
To: Jochen Roller
Subject: FW: Data Request

Hi Jochen,

I am emailing you in relation to the data you sent to my colleague back in March 2015 (see below and attached).

I note, the "2015_054_shapfiles" folder contains a clip of data for the habitat type 3140 (Hard oligomesotrophic waters with benthic vegetation of Chara spp.) which shows the distribution of this habitat type to include Parteen Basin. However, the dataset currently available on the NPWS website is not showing Parteen Basin as part of the range in Ireland.

Can you confirm where the 2015 data was derived from? What year and what study? Does the distribution as currently shown on the NPWS website supersede the file we received in 2015?

Thank you in advance for your help,

Laura

Laura Kennedy, B.Sc., M.Sc.
Project Ecologist/Project Manager

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From: Joanne AllenHamilton
Sent: 08 February 2018 11:32
To: Laura Kennedy
Subject: FW: Data Request

Parteen Only

From: Jochen Roller - (ESRI - DAHG) [mailto:Jochen.Roller@ahg.gov.ie]
Sent: 31 March 2015 17:36
To: Joanne AllenHamilton
Subject: RE: Data Request

Hello Joanne,

Please find requested data attached.

Only one of the sites, Kilcarren-Firville Bog cSAC 000647, currently has a Conservation Plan which is available for download from http://www.npws.ie/protected-sites/conservation-planning/available-plans

There are also Site Specific Conservation Objectives available for the Lower River Shannon cSAC 002165 which can be accessed via the Protected Sites section on our website. For any GIS data that went into the Site Specific Conservation Objectives please see http://www.npws.ie/maps-and-data/habitat-and-species-data

Can I refer you to the Protected Sites section on our website for any other information on the designated sites. Another source of information which you might find useful are the 2013 Article 17 Conservation Assessments. These are available on http://www.npws.ie/publications/article-17-reports

Just to reiterate, as per the data policy, our datasets are not complete or perfect in terms of quality, so it is important to note that the absence of information in the NPWS dataset for an area, does not necessarily imply a low biodiversity value for that area. These data should not be seen as a replacement for field surveys.

Please note that the NPWS species dataset is incomplete, particularly for fish, bats and birds, so please don't be surprised if species listed on the site synopsis do not appear in the dataset. Can I also remind you that locations for sensitive species should not be made publicly available.

The list of what qualifies as a rare or threatened species is available at http://www.npws.ie/mapsanddata/requestdata/ . It covers species listed one or more of the following documents: EU Directives (Birds & Habitats), Wildlife Act, 1976 &

Wildlife (Amendment) Act, 2000, Flora (Protection) Order 1999 or Published National Red Lists. This list is regularly updated, as new legislation is added, or red lists are published, so it is worth checking back to the version available on the NPWS website regularly.

Inland Fisheries Ireland, BirdWatch Ireland, Bat Conservation Ireland and the National Biodiversity Data Centre may have additional records of use.

Best regards,
Jochen

Jochen Roller
National Parks & Wildlife Service
7 Ely Place, Dublin 2, Ireland
Jochen.Roller@ahg.gov.ie
Tel: +353-1-8883073

From: Joanne AllenHamilton [mailto:Joanne.AllenHamilton@tobin.ie]
Sent: 27 March 2015 10:43
To: Jochen Roller - (ESRI - DAHG)
Cc: natureconservation@ahg.gov.ie
Subject: Data Request

Hello Jochen,

Please find attached a data request for information on Lough Derg and Parteen Basin and their surrounding areas. If I can provide further clarification or information please don't hesitate to contact me.

I would be grateful if you could indicate roughly when you would be able to provide this information.

Kind Regards

Joanne Allen-Hamilton M.Sc, B.Sc, MCIEEM
Senior Ecologist

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http://www.tobin.ie

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From: Sarah Nolan
Sent: Monday 20 January 2025 09:35
To: natureconservation@housing.gov.ie; Housing natureconservation; NPWS Biodiversity Data
Cc: Laura Kennedy
Subject: RE: INFORMATION REQUEST

Good Morning,

I am just following up on the below data request made in October 2024. I understand the Spatial and Scientific Data Unit were experiencing some technical issues at the time. I'm just wondering if there is an update on when we might expect to receive this data?

Many thanks
Sarah

Sarah Nolan B.Sc., M.Eng.Sc
Project Ecologist

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Email: sarah.nolan@tobin.ie
Website: http://www.tobin.ie

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2020 Association of Consulting Engineers of Ireland Awards Winner: Project Management
2019 Association of Consulting Engineers of Ireland Awards Winner: Design Excellence (Structures)

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From: Sarah Nolan
Sent: Friday 4 October 2024 15:48
To: natureconservation@housing.gov.ie

Cc: Laura Kennedy <Laura.Kennedy@tobin.ie>
Subject: INFORMATION REQUEST

To whom it may concern,

Please find attached the sensitive data request form and associated information.

Please note the confidentiality of the project in question with the provided GIS maps and shapefiles being preliminary at this time.

Many thanks
Sarah

Sarah Nolan B.Sc., M.Eng.Sc
Project Ecologist

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Email: sarah.nolan@tobin.ie
Website: http://www.tobin.ie

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2019 Association of Consulting Engineers of Ireland Awards Winner: Design Excellence (Structures)
2018 Engineers Ireland Excellence Awards Winner: Engineering Project of the Year

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Tionscadal Soláthair Uisce
Water Supply Project

Natura Impact Statement (NIS)

(Appendix B) NPWS and DEHLG Consultation February 2009

Document no: 32105801/EIAR/NIS/Appendix B
Version: Final

December 2025

Uisce Éireann
Irish Water

Jacobs

TOBIN

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Comhshaol, Oidhreacht agus Rialtas Áitiúil
Environment, Heritage and Local Government

Water Supply Project – Dublin Region,
Ground Floor Block 2,
West Pier Business Campus,
Dun Laoghaire,
Co. Dublin.

27/02/2009

Your ref.: **MDE0599Lt0041**
Our ref.: **G2008/957**

Re: **Water Supply Project (Dublin Region) draft Plan**

A Chara,

We refer to the Council's notification in relation to the above-draft plan. Outlined below are the archaeological heritage and nature conservation recommendations of the Department of the Environment, Heritage and Local Government. These comments are without prejudice to any decision, action or recommendation which may be made by the Minister for the Environment, Heritage and Local Government, concerning the above plan or any future drafts of the plan. Architectural Observations, if relevant, will issue in due course.

Archaeological Heritage Observation

The Environmental Report contains a good assessment of the archaeological sites in the vicinity of each option.

Nature Conservation Recommendations

The Department recommends that the draft Plan is not adopted in the absence of further assessment, as there is reasonable scientific doubt that the plan will not adversely affect one or more European sites, contrary to the conclusion of the Habitats Directive Assessment. Further assessment, inter alia (see below) including (a) aspects of the plan other than source options, (b) desalination pipeline surveys and construction methodologies; (c) alternative sites in Lough Derg, (d) a detailed assessment of the Slevoir Bay area, and (e) confirmation of the engineering feasibility of the design of the abstraction structure, is required before it can be ascertained if the draft Plan will not adversely affect the integrity of the European sites involved.

General comments on SEA and Habitats Directive Assessment
The draft plan, as presented, includes three main elements to meet the projected future water requirements for the Dublin Region. The three main elements are: 1) continued and increased use of existing water sources, 2) measures to reduce water demand and water losses through leakages (i.e. customer side and distribution leakage losses), and 3) development of a new source to augment the existing sources and meet the projected demands. The SEA and Habitats Directive assessment,

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however, deal only with the development of a new source option. A full appropriate assessment of the plan is essentially lacking – see below.

The plan is reduced to a comparative assessment of new water source options (including pipeline routes) for the purposes of SEA and the Habitats Directive Assessment. The assessments are of a suite of project options, to identify, firstly, viable options and, secondly, the preferred option.

From the information available, it appears that the adoption or authorisation stage will involve the adoption of the preferred source option, rather than or possibly in parallel with the adoption of the plan in full. As such, there is no formal consent for the selection of a preferred project option but it is acknowledged that the decisions made at this time will have important implications for the future planning and design stages of the project.

It should be borne in mind that the preferred source option will carry with it any risks in relation to passing the tests of the EIA and Habitats Directives.

Irrespective of the current findings in relation to the likely significant effects on Natura 2000 sites and their conservation objectives, or the risk of adverse effects on the integrity of such sites, the preferred option will require an Article 6(3) appropriate assessment as part of the application for consent, either as part of the EIS or as a separate report. Abstraction of 350Mld from a Natura 2000 site with water-related conservation interests would present a risk of a significant effect on such a site and its conservation objectives, meaning that a full or stage two assessment would be required.

Increasing abstraction from existing sources to the maximum sustainable production is part of the overall plan to meet the increasing water demand for the Dublin Region. It is noted that there is no consideration and assessment of the likely significant effects on Natura 2000 sites of maintaining or increasing the abstraction levels from the existing sources. The maximum sustainable production limit may not be the same as the limit at which significant effects on Natura 2000 sites are likely.

The overall plan includes water conservation measures and works to reduce leakage losses from the system, and certain works are ongoing. It is felt that details of targets and timeframes for improving the current situation should be included in the plan and monitored as part of the SEA.

It should be noted that any changes to the draft plan as a result of consultations and feedback will require Habitats Directive screening, with the associated report updated and amended as appropriate, prior to adoption stage.

Owing to changing economic circumstances, the population and water demand projections may now require review and revision.

Pipeline routes
While it is stated that the potential pipeline options do not directly impact on any SACs or SPAs, apart of course for Lough Ree and Lough Derg at the abstraction point for those options, such a pipleline is bound to have a number of crossings of water courses with issues of concern to the natural

heritage which will need to be addressed at EIA stage. We request that when the pipeline options are being considered at EIA stage that we are consulted further.

In line with the National Biodiversity Plan and Irelands responsibility to halt loss of biodiversity by 2010 measures to enhance biodiversity should be considered as part of this project. In order to minimise impacts on biodiversity in the wider countryside the possibility of using manmade route corridors already in place such as roads and railways should be considered, and consideration should also be given to incorporating the pipeline into any other existing infrastructure.

Option A – Abstraction from Lough Ree
The National Parks and Wildlife Service (NPWS) supports the finding of the Appropriate Assessment relating to this option.

Option B – Abstraction from Lough Derg
Option B consists of four components:
(B1) Abstraction (generally) from Lough Derg;
(B2) Abstraction (specifically) from Slevoir Bay;
(B3) Treatment and pumping facilities at Slevoir Bay;
(B4) Water pipeline from Lough Derg to the Dublin region.

B1 – Abstraction (generally) from Lough Derg
The eastern part of Lough Derg is part of the Lough Derg (Shannon) SPA, designated under the European Communities (Conservation of Wild Birds) (Amendment) (No. 2) Regulations, 1995 (S.I. No. 285 of 1995). The conservation objectives for this site relate to the species listed on p. 66 of the Habitats Directive Assessment plus golden plover, hen harrier, black-tailed godwit, curlew, and garden warbler.

The north-eastern half is part of the Lough Derg, North-east Shore cSAC. All the eastern part of Lough Derg, and continuing down to Ballina, is part of Lough Derg pNHA. The conservation objectives for the cSAC relate to the habitat types Juniper scrub, Cladium fen (a priority habitat), limestone pavement (a priority habitat), alluvial forest (a priority habitat) and yew woodland (a priority habitat).

The Habitats Directive Assessment concludes that Option B will not adversely affect the integrity of the site, if the hydrological regime of the Shannon is maintained by compensating by reduction in flow down the headrace of Ardnacrusha Dam, and if Options F1 and/or F2 are also used as mitigation. It is not clear from the draft plan how the obligation to maintain this compensatory flow will be achieved, given that the Regulations and Guidelines for Control of the River Shannon only specify maximum and minimum levels, rather than regimes. This mechanism will need to be described more clearly in the final plan, with supporting documentation from the ESB, before there is no reasonable scientific doubt that the abstraction will not adversely affect the integrity of the site.

While it is unlikely1 that significant eutrophication would result from the increased residence time of water in Lough Derg, especially if nutrient management measures were to be cited as contingency

mitigation measures, nevertheless further information on this should be included in the Habitats Directive Assessment.

The conclusion relating to the design of the abstraction structure, irrespective of where it is planned to locate it in Lough Derg, is the same as for Parteen Basin (see C1 below): A significant adverse effect cannot be ruled out until the feasibility of an appropriate design is confirmed.

B2 – Abstraction (specifically) from Slevoir Bay
While Sect. 3.6.2.1 refers to the mapped abstraction site (Fig. 4.5) as a potential site, the conclusion that there will be no adverse effects on the integrity of the either the SPA or cSAC cannot be supported when such a restricted project-level location is specified. This is because, in the absence of data, it cannot be concluded that any of this restricted area will be without adverse effects. Slevoir Bay is a combined SPA/cSAC/pNHA designation, and no assessment of other alternatives on the east shore on Lough Derg have been carried out. Effects on the Lough Derg pNHA in Slevoir Bay will also need to be assessed in more detail as part of the SEA.

B3 - Treatment and pumping facilities at Slevoir Bay
It is considered feasible (according to best practice methods) to locate and construct the treatment facility, and to dispose of treatment plant sludge, outside the designated sites without an adverse effect on the integrity of any of the sites. However this needs to be stated in the plan.

B4 - Water pipeline from Lough Derg to the Dublin region
The proposed pipeline route bypasses, at some distance, all designated sites in Co. Tipperary, and is not considered by the Assessments likely to significantly affect these sites. However, the pipeline crosses upstream of the River Barrow and River Nore cSAC, and a statement is required in the plan that the mitigation methods for, and timing of, the crossing will be carried out to avoid any adverse effect on the integrity of this cSAC, which contains populations of the freshwater pearl mussel type Margaritifera durrovensis (Margaritifera margaritifera).

Option C – Abstraction from Parteen Basin
Option C consists of four components:
(C1) Abstraction (generally) from Parteen Basin;
(C2) Abstraction (specifically) from near Parteen Weir;
(C3) Treatment and pumping facilities near Parteen Basin;
(C4) Water pipeline from Parteen Basin to the Dublin region.

C1 – Abstraction (generally) from Parteen Basin
Parteen Basin, some of the lands on the east bank of the basin, and the Kilmastulla River (which runs parallel to the east bank), are part of the Lower River Shannon cSAC. The conservation objectives applying to this part of the cSAC potentially relate to salmon, sea lamprey, river lamprey, brook lamprey, otter, floating river vegetation habitat and alluvial forest habitat.

The Habitats Directive Assessment concludes that Option C will not adversely affect the integrity of the site, if the hydrological regime of the Shannon is maintained according to listed mitigation measures:
Design of the abstraction structure to reduce or remove the risk of entrainment and/or impingement of fish: It is stated (Sect. 4.12.2.3) that an appropriate design be put forward for this structure. It is understood that abstraction structures are in operation that can reduce velocities to a level that even small fish and macrocrustacea can escape; therefore, this mitigation measure, if suitably designed and located relative to fish and otter habitat and dispersal routes within Parteen Basin, will not adversely affect the integrity of the site. However, confirmation of the engineering feasibility of this design in relevant conditions in Parteen Basin is necessary before there is no reasonable scientific doubt that the abstraction will not adversely affect the integrity of the site.
No change in flow down the River Shannon below Parteen Weir due to compensatory reduction in flows down the headrace to Ardnacrusha Dam, "except where discharge is sufficiently high that the percentage reduction in flow is small [5-10%] compared with the total discharge" (Sect. 4.12.2.1). It is not clear from the draft plan how the obligation to maintain this compensatory flow will be achieved, given that the Regulations and Guidelines for Control of the River Shannon only specify maximum and minimum levels, rather than regimes. This mechanism will need to be clarified before there is no reasonable scientific doubt that the abstraction will not adversely affect the integrity of the site.

C2 - Abstraction (specifically) from near Parteen Weir
While Sect. 3.6.3.1 refers to the mapped abstraction site (Fig. 4.7) as a potential site, the conclusion that there will be no adverse effects on the integrity requires more site-specific assessment data.

C3 - Treatment and pumping facilities near Parteen Basin
It is considered feasible (according to best practice methods) to locate and construct the treatment facility, and to dispose of treatment plant sludge, outside the Lower River Shannon cSAC without an adverse effect on the integrity of the site. However this needs to be stated in the plan.

C4 - Water pipeline from Parteen Basin to the Dublin region.
The proposed pipeline route bypasses, at some distance, all designated sites in Co. Tipperary, and is not considered by the Assessments likely to significantly affect these sites. However, the pipeline crosses upstream of the River Barrow and River Nore cSAC, and a statement is required in the plan that the mitigation methods for, and timing of, the crossing will be carried out to avoid any adverse effect on the integrity of this cSAC, which contains populations of the freshwater pearl mussel type Margaritifera durrovensis (Margaritifera margaritifera).

Option D (Phase 2) – Abstraction (in part) from Lough Ree
The National Parks and Wildlife Service supports the finding of the Habitats Directive Assessment relating to this option.

Options E & G
The Habitats Directive Assessment identified that for options E and G there could be impacts on All Saints Bog and Esker cSAC and SPA, Mongan Bog cSAC and SPA and Finlough Lough cSAC and

that the hydrology needed further investigation. It was concluded that it was not certain if they would adversely affect the integrity of a European site so the precautionary principle must be applied and more studies would be needed. These potential impacts would include changes in the wintering flooding regime (particularly in Lough Ree), which would directly impact on important foraging areas for migratory birds. Alterations to the winter flooding regime would also impact on the dynamics involved with the transfer of nutrients from floodwater to important seasonal flooded habitats.

Option E has identified a potential water storage site on cutaway bog on the Westmeath/Offaly border near Rochfortbridge. Transmission from Lough Ree to this site may indirectly impact on a number of designated sites including Natura 2000 sites. It may also impact on locally important areas of ecological interest, which have no statutory protection. This must be a serious consideration in any further assessment of Option E. NPWS are aware that there may be significant ecological benefits associated with the creation of a large wetland area (storage) in the Midlands, and are prepared to advise and assist with optimising the potential of any such site.

We therefore request that if these options are to be considered further, that the additional studies would be carried out and the options subject to appropriate assessment and NPWS consulted prior to proceeding to EIA stage.

Option F
The comments relating to Option B above, also apply to the Lough Derg abstraction part of this option.

Options F1 and F2 require an ecological study in order to examine the possibilities for ecological design, habitat creation etc. If these options are to be considered then we would like to see the results of these studies and the design should be subject to appropriate assessment.

Option H – Desalination
There are a number of sites along the north Dublin coast that have been proposed for nature conservation under Council Directive 92/43/EEC including Rogerstown Estuary cSAC (000208) designated for inter alia the marine Annex I habitat: Mudflats and sandflats not covered by seawater at low tide and Estuaries; Malahide Estuary cSAC (205) designated for Mudflats and sandflats not covered by seawater at low tide; Baldoyle Bay cSAC (199) designated for Mudflats and sandflats not covered by seawater at low tide; Lambay Island cSAC designated for the Annex II species grey seal. In addition, the following sites Skerries Islands SPA (4122), Rockabill SPA (4014), Lambay Island (4069), Rogerstown SPA (4015) and Broadmeadow/Swords Estuary (4025) under Council Directive 79/409/EEC.

The Section 10 (Environmental Considerations) of the Desalination Study Report is insufficient to consider the range of likely impacts from the proposed construction and operation of the desalination plant. It is likely that the plan would result in a potential for impacts upon the marine environment. The proposed work would involve the passage of at least one pipeline through the foreshore. In order to consider sites suitable for the pipeline a geotechnical and geophysical survey would need to be

completed. The pipe-lay operations associated with the works would be likely to involve trench laying and possibly re-profiling of the substrate.

In the operational phase the abstraction of water is unlikely to significantly impact upon the marine environment provided it is not located within designated areas. However, there is a potential for interaction from the dispersal of hyper-saline and possibly thermally altered effluent from the desalination plant. Although the documentation has modelled the likely dispersal of this plume and considered that there is unlikely to be a significant impact upon currently designated sites it has not considered the potential for interaction with marine Annex II species (bottlenose dolphins, harbour porpoise, common and grey seals) and Annex IV species (all cetaceans).

NPWS considers that following information should be included in the document to ensure that an appropriate assessment of the potential impact upon marine protected habitats and species can be made:

- → The predicted marine surveys and the associated methodologies required to construct the pipelines associated with the desalination plant
- → The likely construction methodologies for the proposed pipelines
- → The potential impacts upon Annex II and IV species from the proposed construction and operation of the proposed desalination plant

Should you require any further assistance, please do not hesitate to contact us at the following address.

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Tionscadal Soláthair Uisce
Water Supply Project

Natura Impact Statement (NIS)

(Appendix C) SEA Phase 2 HDA Report

Document no: 32105801/EIAR/NIS/Appendix C
Version: Final

December 2025

Uisce Éireann
Irish Water

Jacobs

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Dublin City
Baile Átha Cliath

WATER SUPPLY PROJECT - DUBLIN REGION (DRAFT PLAN)

(Previously titled: Greater Dublin Water Supply - Major Source Development (Draft Plan))



Habitats Directive Assessment

VEOLIA WATER

November 2008

RPS

ACKNOWLEDGMENTS

This Habitats Directive Assessment has been undertaken by RPS in conjunction with Natura Environmental Consultants and Ecological Consultancy Services.

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APPENDICES

APPENDIX A: National Parks and Wildlife Service: Natura 2000 Screening Protocol - Water Services Plans and Projects

EXECUTIVE SUMMARY

INTRODUCTION

Dublin City Council (DCC), acting on behalf of the local authorities in the Dublin Region Water Supply Area (DRWSA), is studying a range of options for developing a new major water supply for the DRWSA. The requirement for a new water supply is based on the future planned development of the Greater Dublin Area (GDA).

The current study is entitled Water Supply Project – Dublin Region (Draft Plan). During the preparation of this draft Plan it has been identified that there could be 'likely significant impacts' on sites of nature conservation importance and therefore there was a need for an assessment of these sites as required by the Habitats Directive (92/43/EEC). This Habitats Directive Assessment Report assesses the potential for significant impacts on the integrity of these sites as a result of implementing the draft Plan and the technically feasible options contained within it.

LEGISLATIVE CONTEXT

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as "The Habitats Directive", provides legal protection for habitats and species of European importance. Articles 3 to 9 of the Directive provide the legislative means to protect habitats and species through the establishment and conservation of an EU-wide network of sites. These sites include Special Areas of Conservation (SACs), designated under the Habitats Directive, and Special Protection Areas (SPAs), designated under the Conservation of Wild Birds Directive (79/409/ECC). Collectively, these sites are known as Natura 2000 sites or European sites.

A Habitats Directive Assessment (HDA) (also known as appropriate assessment) is required under the Habitats Directive for any plan or project likely to have a significant effect on an internationally important site for nature conservation. Article 6(3) of the Habitats Directive establishes the need for appropriate assessment;

"Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives".

There are three stages in a Habitats Directive Assessment:

i) Screening – determining whether a plan is likely to have a significant effect, alone, or in combination with others, on a European site. Where there is doubt about the significance of the effects, the

"precautionary principle" applies and further research should be undertaken. If significant effects are found, the plan must be subjected to the next stage.

ii) Appropriate Assessment – determining whether, in light of the site's nature conservation objectives, the plan would have, or risk having, an adverse impact. There must be a high level of certainty that there are no adverse effects.

iii) Mitigation measures and alternative options- where there is risk of, or are/is, adverse effects on the site's nature conservation objectives, alternatives should be considered. Where no alternatives exist, any outstanding adverse effects should be mitigated.

THE DRAFT PLAN

The draft Plan outlines a number of potential water sources and provides detailed information on a wide range of reasonable options, which would be technically capable of supplying the Dublin Region with the required 300 mega litres per day (Ml/d) of drinking water. These options are summarised in **Tables 1** and **2**.

Table 1 Summary of Options Outlined within the draft Plan

Water Source	Ref.	Options	Summary Details
Shannon	A	Lough Ree	Potential maximum abstraction from River Shannon at Lough Ree of 350 Ml/d Abstraction Pipe, Pump House, Water Treatment Plant and Twin Transmission Pipeline of approx 104km required.
Shannon	B	Lough Derg	Potential maximum abstraction from River Shannon at Lough Derg of 350 Ml/d. Abstraction Pipe, Pump House, Water Treatment Plant and Twin Transmission Pipeline of approx 122m required.
Shannon	C	Parteen Basin	Potential maximum abstraction River Shannon at Parteen Basin of 350 Ml/d. Abstraction Pipe, Pump House, Water Treatment Plant and Transmission Pipeline of approx 158km required.
Shannon	D	Lough Ree & Lough Derg	Potential maximum abstraction of 350 Ml/d. Abstraction Pipe, Pump House, Water Treatment Plant and Transmission Pipeline of approx 171km required. Pipeline constructed in two phases approximately 10 years apart. Phase 1 requirement of 250Mld from Lough Ree and Phase 2 requirement of 104Mld from Lough Derg.
Shannon & Groundwater	E	Lough Ree & Groundwater & Storage	Abstractions from Lough Ree to be pumped to a former cutaway bog land area site near Rochfortbridge. Part of the former cutover bog is being quarried for sand and gravel deposits. Abstractions of up to 500Mld between November and July the following 4 months abstractions of 50Mld. Four months of storage supply will be available. This storage can ensure that abstractions from Lough Ree are minimised during low flow periods on the Shannon. Abstraction Pipe, Pump House, Water Treatment Plant and Transmission Pipeline of approx 104 km required.

Water Source	Ref.	Options	Summary Details
Shannon & Groundwater	F1	Lough Derg & Groundwater & Storage	Abstraction from Lough Derg to be pumped to a former cutaway bog land area site near Rochfortbridge, same location as Option E. Abstractions of up to 410Mld for ten months of the year and 2 months of 50Mld. Abstraction Pipe, Pump House, Water Treatment Plant and Transmission Pipeline of approx 127 km required. Abstraction will vary depending on usage of storage.
Shannon	F2	Lough Derg & Storage	Abstraction from Lough Derg to be pumped to a former cutaway bog land area site near Clonygowan. Abstraction Pipes, Pumping Station and Booster, Transmission Pipelines, Water Treatment Plant. Abstraction will vary depending on usage of storage. Pipeline length is 122km
Shannon	G	Lough Ree (or Lough Derg) & Impoundment	Abstraction from Lough Ree or Lough Derg to be impounded in the Wicklow Mountains. Abstractions of up to 420Mld from Lough Ree between the months of November and July and abstractions of 60Mld for the remaining months. Storage will be available for up to 4 months average supply requirement. Abstraction Pipes, Pumping Station and Booster, Transmission Pipelines of approx 113km, Water Treatment Plant, plus a dam required for the impoundment.
Irish Sea	H	Desalination	Potential maximum abstraction of 300 Ml/d from the Irish Sea. Abstraction Pipe, Desalination Plant and Transmission Pipeline of approx 25km required.
Groundwater	I	Fingal/ Kildare Groundwater (will have to be combined with one or more other options)	Abstractions of water from groundwater sources in Fingal and Kildare and piping of groundwater to suitable locations for treatment and introduction to public water supply systems.
Rivers Liffey & Barrow	J	Liffey/ Barrow (will have to be combined with one or more other options)	Abstractions of water from both the Upper Liffey and Barrow. Abstraction of water from the River Barrow to Ballymore Eustace treatment plant, Transmission Pipeline is required.

Table 2 Details of the Key Infrastructure Required within the draft Plan

Key Infrastructure	Summary Details
Pipeline (Options A-J)	A pipeline would be required for all the options. The pipeline would connect the abstraction point to the distribution point via a Water Treatment Plant (Option A –G) or a Desalination Plant (Option H). In the case of Option I & J, the pipeline will connect the source directly to the distribution point. The first part of the pipeline would transport raw/untreated water from the abstraction point to either the desalination plant (DP) or water treatment plant (WTP). The second part of the pipeline would convey clear/treated water between the DP or WTP to the distribution network.
Pump House (Options A-G)	A Pump House is a facility where water is pressurised to enable its transportation over long distances. A booster pumping station may be required to overcome the energy losses during transport.
Water Treatment Plant (Options A-F)	A WTP is a facility where water is treated to permit its safe consumption/use. The usual treatment process consists of coagulation, flocculation, settling, rapid sand filtration and disinfection through chlorine.
Desalination Plant (Option H)	Desalination is the process of removing the salts contained in seawater to make it suitable for human consumption. The majority of modern desalination plants use a technique based on water filtration through semi-permeable membranes under high pressure. This is an energy demanding process compared to surface water treatment and transport.
Impoundment (Option G)	Impoundment is the storage of water in a man-made reservoir such as behind a dam in a natural valley.

SCREENING OF SITES

A 15km study area was created showing the regions potentially affected by implementation of the draft Plan and all of the European sites (SACs and SPAs) located within this. In all, 123 SACs and 42 SPAs were identified within the study area.

The proposed water supply options were then outlined in terms of their physical characteristics and the potential effects they might have on the European sites. Any of the options that involve abstraction of surface water or groundwater would involve the construction of pump houses, water treatment plants and the installation of abstraction pipes and land pipelines. Impoundment of abstracted water would require the construction of a dam and reservoir. Construction and operation of the infrastructure for the options could result in the following effects:

- Fluctuations in surface water levels;
- Increase in low flows;
- Increase in residence time in the lakes; and
- Direct loss of habitat.

Residence time is defined as the average length of time water spends in a lake. The issue of changes to residence times is relevant to abstraction from lakes and so is relevant to the Lough Ree and Lough Derg Options. Increasing the residence time of a lake may have an impact upon the ecology of the lake.

The desalination option would result in sea water abstraction and the construction of an abstraction pipe, desalination plant and land pipeline. The resulting effects include discharge of coagulant, antiscalant and brine, changes in chemical composition of seawater and direct loss of habitat. As well as direct habitat loss, these effects could result in indirect impacts such as toxic contamination/pollution, non-toxic contamination such as increased salinity levels and disturbance to protected species.

With regard to the strategic routing of pipelines from each of the options, an assessment was undertaken to ensure that it was possible to route the pipelines without directly impacting any European sites. The potential pipeline options do not directly impact any SACs or SPAs within the draft Plan study area. However the abstraction facility for the Lough Ree and Lough Derg pipeline options will impact directly on the Lough Ree SAC/SPA and Lough Derg SAC/SPA.

Following the preliminary screening assessment it was possible to eliminate those sites that could be shown to have no physical, hydrological or other potential links with the proposed options and would

therefore not be adversely affected. This reduced the list of potentially affected sites to 26 SACs and 14 SPAs. These sites were then subject to the Appropriate Assessment stage.

APPROPRIATE ASSESSMENT

INTRODUCTION

The objective of the 'Appropriate Assessment' stage is to determine whether implementation of the draft Plan (either alone or in combination with other plans, programmes and projects) would result in significant adverse impacts to the integrity of a site with respect to the site's structure, function and/or conservation objectives. The appropriate assessment involved the following steps:

- Determination of the qualifying feature and conservation objectives of the European sites;
- Determination of the sensitivity of the qualifying feature; and
- An appropriate assessment in combination with other plans/ programmes/ projects which will consider the characteristics of the draft Plan options and their potential significant adverse effects on the integrity of the European sites.

SENSITIVITY OF QUALIFYING FEATURES AND CONSERVATION OBJECTIVES

The list of European sites potentially affected by implementation of the draft Plan and their qualifying features were identified in the screening stage of the assessment. Each of the qualifying features have been assessed as to their sensitivity, based on the type of habitat or species present at the site. For example Lough Ree and Lough Derg have been designated for the presence of alkaline fens, among other habitats. This habitat type is groundwater dependant and is highly sensitive to hydrological changes and changes in nutrient or base status.

The National Parks and Wildlife Service have established general conservation objectives for the European sites as follows:

- To maintain, and where possible, enhance the Annex I habitats for which the SAC has been selected at favourable conservation status.
- To maintain the Annex II species for which the SAC has been selected at favourable conservation status.
- To maintain, and where possible enhance, the extent, biodiversity and species richness of the site.
- To maintain other habitats at favourable conservation status.

- To establish effective liaison and co-operation with landowners, legal users and relevant Authorities.

Detailed Conservation Objectives were also available for Fin Lough (Offaly), Raheenmore, Mongan Bog and Kilcarren-Firville Bog SACs and Mongan Bog and Kilcarren-Firville Bog SPAs.

ASSESSMENT

Following the identification of the qualifying features and conservation objectives of the European sites an appropriate assessment was carried out to identify the implications for each of the sites identified in the screening stage site in view of that site's conservation objectives. Extensive modelling was carried out to evaluate the impact of each of the options for supplying drinking water to the Dublin Region. The results of the assessment are summarised in the following sections.

Option A

The result of the assessment indicates that, in the absence of modifications to sluice operations at Athlone, abstraction from Lough Ree will result in an alteration to water levels, increased low flow duration periods and increases in retention times downstream in Lough Derg. These impacts are considered to constitute a likely significant adverse impact on European sites. It is therefore concluded that Option A will adversely affect the integrity of European sites.

Option B

The principal impact of Option B is the marginal increase in residence time in Lough Derg. Investigations to date have indicated that this does not constitute a likely significant adverse impact upon Lough Derg. It is therefore concluded that Option B will not adversely affect the integrity of European sites.

Option C

Once the hydrological regime of the Lower River Shannon (downstream of Parteen Weir) is maintained, there will be no likely significant adverse effect on Lough Derg and other European sites affected by this option. It is therefore concluded that Option C will not adversely affect the integrity of European sites.

Option D

The result of the assessment indicates that the reduced level of abstraction of water from Lough Ree will still result in significant alteration to water levels and low flow period duration as per option A. These impacts are considered to constitute a likely significant adverse impact on European sites. It is therefore concluded that Option D will adversely affect the integrity of European sites.

Option E

Option E is proposed to mitigate against the adverse effects of Options A and D. While target levels and minimum operating levels are achieved under this option, there remains uncertainty in relation to the extent of the impact of lower water levels and prolonged low flow. It is uncertain whether these impacts are considered to constitute a likely significant adverse impact on European sites, until further studies are completed. The precautionary principle must be applied; therefore, Option E is not recommended without further study.

Options F1 and F2

Options F1 and F2 offer robust operational flexibility and do not constitute a likely significant adverse impact on European sites. It is therefore concluded that Options F1 and F2 will not adversely affect the integrity of European sites.

Option G

Option G is proposed to mitigate against the adverse effects of Option A. While target levels and minimum operating levels are achieved under this option, there remains uncertainty in relation to the extent of the impact of lower water levels and prolonged low flow. It is uncertain whether these impacts are considered to constitute a likely significant adverse impact on European sites, until further studies are completed. The precautionary principle must be applied; therefore, Option G is not recommended without further study.

Option H

Mitigation measures have been identified to deal with the potential impacts. Once these measures are adhered to, it is considered that there will be no likely significant adverse effect on European sites. It is therefore concluded that Option H will not adversely affect the integrity of these European sites.

In Combination Effects

Following a review of the plans and projects that may interact with the draft Plan, it has been concluded that the only one that has the potential to have a significant in-combination effect is the abstraction of water from Killinure Lough, Lough Ree for supply of water planned by Westmeath County Council. This abstraction and Option A are interrelated.

MITIGATION

Where a likely significant adverse effect has been identified, or cannot conclusively be ruled out, it may be possible to proceed with the option where mitigation measures can be implemented to

address the adverse effect. The mitigation hierarchy includes mitigation by avoidance, mitigation by reduction and mitigation by remedy, with avoidance being the preferred option.

In general all of the options require a water intake and therefore there is a risk of entrainment and / or impingement of fish. In light of this, appropriate design of an intake is important. Low intake velocities, appropriate screening and correct orientation of the intake are all aspects that should be considered in designing and installing the intake structure.

Additional possible mitigation measures have also been proposed which will help to maintain water levels and flows in the River Shannon system particularly during the summer when water levels may be low. These measures may include altering abstraction rates during the winter when flows are very high for use during the summer when flows are low and when the abstraction rate would be reduced or abstraction ceased altogether. In reality, this mitigation has been presented as separate options (Option E, F1/F2, and G), which relate to storage, while Option D is an option aimed at phasing the abstraction and including future abstraction from Lough Derg to minimise impacts on Lough Ree and the River Shannon Callows. Potential impacts from Option H- Desalination can be mitigated by careful disposal of any potentially polluting wastes.

CONCLUSIONS

The appropriate assessment showed that Options B, C, F1, F2 and H will not have any adverse impact on the integrity of the European sites within the study area. Options A and D do not meet the appropriate assessment test even after mitigation measures have been outlined and therefore they are options that the draft Plan cannot adopt. The precautionary principle has been applied to Options E and G as existing data does not provide enough certainty to determine no risk to the integrity of a European Site. Further studies would be required to alter the existing conclusion of the appropriate assessment for Options E and G. These further studies could possibly establish whether there is a risk to the integrity of the sites.

Once a preferred option has been chosen and the draft Plan adopted it is recommended that a working group is established comprising members of statutory bodies such as the NPWS, the Regional Fisheries Boards, the EPA, and other relevant bodies to assist in scoping of the ecological surveys required prior to the EIA phase. The surveys should be commissioned prior to beginning the EIA phase to allow enough time for the work to be conducted. On-going consultation should be carried out between the design team and the working group. Given the scale and duration of the proposed plan, every effort should be made to anticipate potential impacts and mitigate where possible.

1 INTRODUCTION

1.1 THE DRAFT PLAN

RPS has been appointed by Dublin City Council (DCC) to undertake a Strategic Environmental Assessment (SEA) of the Water Supply Project - Dublin Region (Draft) Plan. During the scoping process of the SEA it was identified that there could be 'likely significant impacts' on European sites and therefore there was a need for an appropriate assessment as required by the Habitats Directive (92/43/EEC). This report is titled Habitats Directive Assessment (HDA) and it outlines the appropriate assessment that was undertaken for the Water Supply Project – Dublin Region (draft Plan), hereafter referred to as the Draft Plan. This report should be read in conjunction with the Draft Plan and the SEA Environmental Report.

Dublin City Council (DCC), acting on behalf of the local authorities in the Dublin Region Water Supply Area (DRWSA), is carrying out studies into water supply options for development of a new major water supply for the DWSA. The requirement for a new water supply is based on the future planned development of the Greater Dublin Area (GDA) as identified in the National Spatial Strategy (2002-2020) and in previous studies carried out to investigate how water demand from future development in the GDA can be met when existing GDA sources have been developed to their sustainable supply limits.

This Habitats Directive Assessment Report undertakes a phased assessment to ascertain if there are likely significant impacts on the integrity of European sites as a result of the draft Plan and the technically feasible options contained within it. RPS contracted Natura Environmental Consultancy and Ecological Consultancy Services (Ecoserve) to undertake the ecological work required for this Habitats Directive Assessment.

1.2 CHANGE OF DRAFT PLAN TITLE

For clarity the reader should note that there has been a revision to the name of the draft Plan since the inception of the Draft Plan in 2005. At that time and for Phase I of the Strategic Environmental Assessment Process it was titled 'Greater Dublin Water Supply – Major Source Development'. It has subsequently been changed to 'Water Supply Project – Dublin Region' to better reflect the objectives within the draft Plan.

1.3 LEGISLATION

An appropriate assessment is required under the EC Habitats Directive (92/43/EEC) for any plan or project likely to have significant effect on an internationally important site for nature conservation. These internationally important sites include, Special Protection Areas (SPAs) and Special Areas of Conservation (SACs). Article 6(3) of the Habitats Directive establishes the need for appropriate assessment;

"Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives".

The Habitats Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna compliments the provisions of the Birds Directive 79/409/EEC. The Birds Directive provides a framework for the protection of all wild bird species naturally occurring in the European Union, through the designation of Special Protection Areas (SPAs). It is implemented in Ireland under the Wildlife Act (1976) and the Wildlife (Amendment) Act (2000).

The main aim of the Habitats Directive is "*to contribute towards ensuring biodiversity through the conservation of natural habitats of wild fauna and flora in the European territory of the Member States to which the treaty applies*" (92/43/EEC). Actions taken in order to fulfil the Directive must be designed to "*maintain or restore, at a favourable conservation status, natural habitats and species of wild fauna and flora of Community interest*" (92/43/EEC). The Directive provides for the creation of protected sites known as Special Areas of Conservation (SACs) for a number of habitat types and certain species of flora and fauna. The Directive also seeks to establish "Natura 2000", a network of protected areas throughout Europe. SACs together with the SPAs form the Natura 2000 network. The Directive was incorporated into Irish law by the European Communities (Natural Habitats) Regulations, SI 94/1997, under Regulation 31 (Annex 1.2).

1.4 EUROPEAN SITES IN IRELAND

There are 142 SPA sites in Ireland with a further 19 proposed SPA sites. They are generally designated on the basis that:

- the site is used regularly by 1% or more of the national population of bird species listed in Annex 1 of the Birds Directive,

- the site is used by 1% or more of the population of a regularly occurring migratory species or the site is used by over 20,000 waterfowl or 20,000 seabirds in a single season.

Ireland has 423 SAC sites, covering around 10% of the country. SACs are designated on the basis that the Habitats Directive requires the establishment of a European network of sites that will make a significant contribution to conserving the 189 habitat types and 788 species identified in Annexes I and II of the Habitats Directive. The listed habitat types and species are those meeting the Directive's criteria and thus considered to be most in need of conservation at a European level. There are 58 habitats and 25 species in Ireland that are included in Annex I and Annex II of the Directive.

1.5 HABITATS DIRECTIVE ASSESSMENT

The Habitats Directive Assessment can be divided into four stages, which are further detailed in **Section 2** of this document, they include;

Stage 1 – Screening

Stage 2 – Appropriate Assessment

Stage 3 – Assessment of Alternative Solutions

Stage 4 – No Alternative Solutions and Adverse Impacts Remain

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures. It aims for the Plan to avoid all negative impacts on European sites by early identification of impacts and alterations to the plan to avoid such impacts. The next step involves the implementation of mitigation measures in order to reach the stage where there are no adverse impacts on the European site(s). The Directive outlines, that should the plan result in adverse effects and no practicable mitigation is possible, then the plan should not be taken forward in its current form. If this worst-case scenario is reached then the plan may have to undergo an assessment of the alternative solutions. Should there be no alternative solutions and the plan is required for reasons of overriding pubic interest then a further test can be undertaken.

1.6 OBJECTIVES OF HABITATS DIRECTIVE ASSESSMENT

The objective of this appropriate assessment is to assess the impacts of the Draft Plan in combination with the effects of other plans and projects against the conservation objectives of European designated sites (i.e. part of the Natura 2000 network) to ascertain whether the plan would adversely affect the integrity of those sites.

The focus of the assessment of the significance of the effect on the European site is directed to the designated interest features and the conservation objectives of the site, along with its integrity, on the

basis of informed and professional judgment. An effect can be defined as something, which would compromise the functioning and viability of the European site and prevent it from sustaining the features for which it was designated in an adequate condition. In accordance with the precautionary principle if there is insufficient information available to make a judgment decision it may have to be assumed that there is potential for a significant effect.

1.7 REPORT CONTENT

This introductory section has outlined the objectives of the draft Plan and the legislative requirements of a Habitats Directive Assessment. The remainder of this report will demonstrate the steps involved in the HDA process and the appropriate assessment itself. The report is structured using the following sections:

Section 2: The stages involved in a Habitats Directive Assessment and corresponding steps are outlined.

Section 3: This section provides details on the Screening Stage of the Habitats Directive Assessment. It identifies the European sites potentially significantly affected by the draft Plan.

Section 4: The details of the appropriate assessment are presented within this section. Sites identified in **Section 3** as being potentially significantly affected are assessed. Conclusions of the appropriate assessment are presented

Section 5: Further Studies are identified

Section 6: Glossary of Terms

Section 7: References

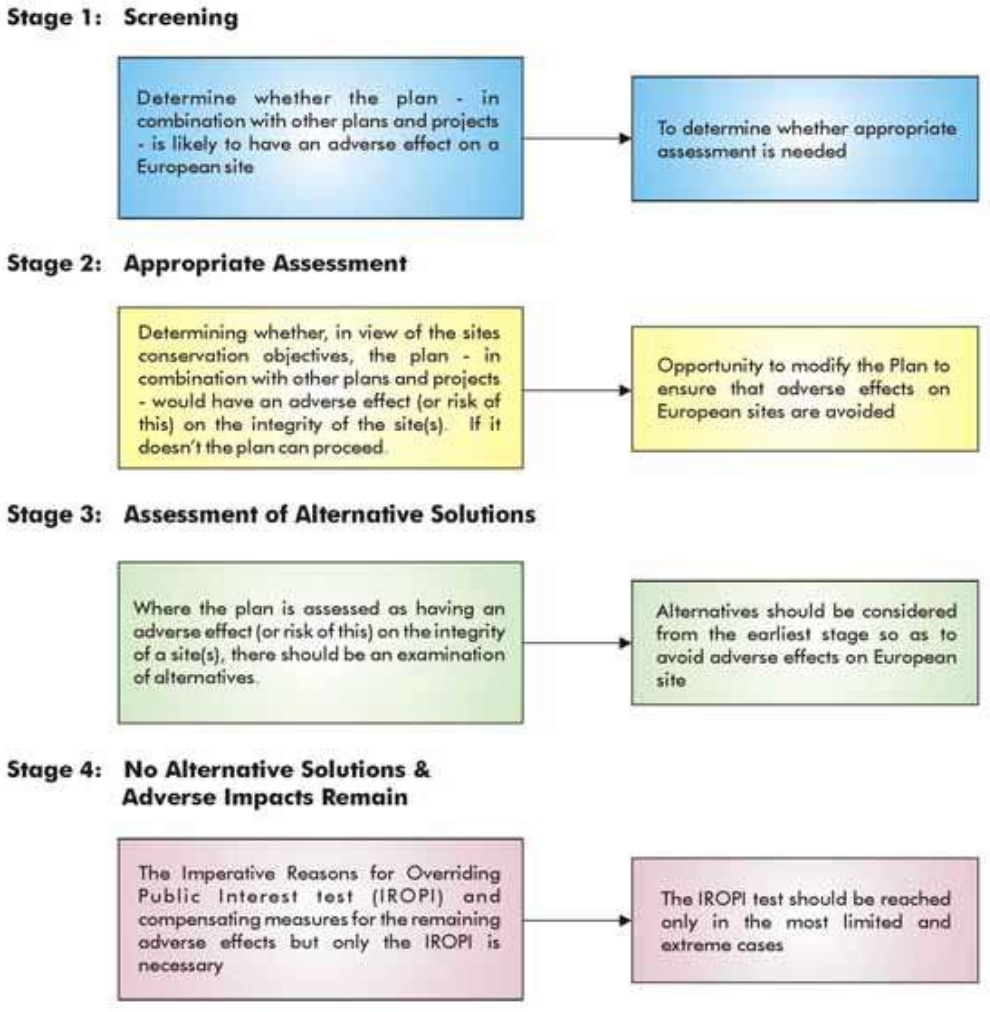
For clarity the reader should note that where reference is made to European sites and the Natura 2000 network, this includes Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

2 STAGES INVOLVED IN HABITATS DIRECTIVE ASSESSMENT

2.1 INTRODUCTION

This chapter explains the stages that are involved in undertaking a Habitats Directive Assessment (HDA). There are four main stages in a HDA and they are outlined in **Figure 2.1**.

Figure 2.1: Stages in the Habitats Directive Decision Making Process

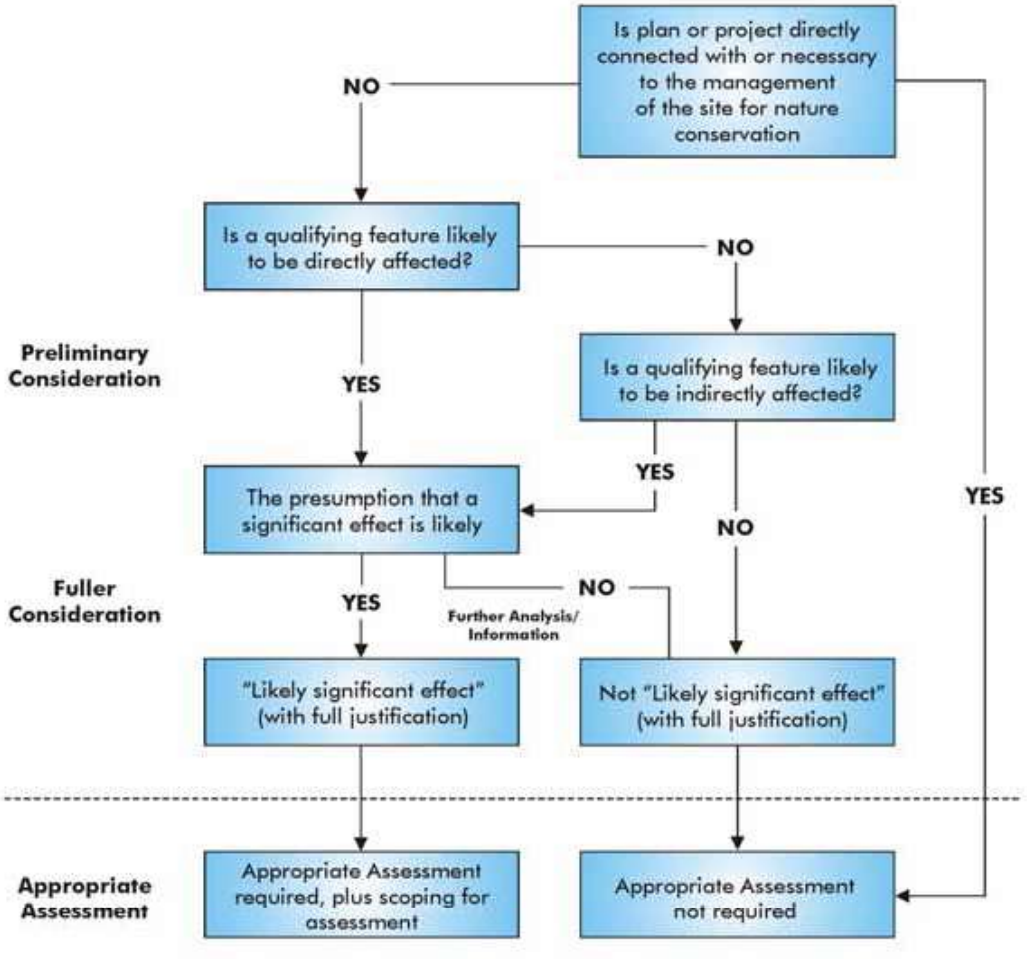


Source: Appropriate Assessment of Plans. Authors: Scott Wilson, Levett-Therivel Sustainability Consultants, Treweek Environmental Consultants and Land Use Consultants (September 2006).

2.2 STAGE 1 - SCREENING

The first step requires clarification as to whether the draft Plan requires an appropriate assessment and **Figure 2.2** provides an outline of the steps involved in Stage 1. Should it be ascertained that there are likely significant effects from the draft Plan then the next step is to undertake an appropriate assessment.

Figure 2.2: Determining whether a Significant Effect is Likely on a European Site



Source: Ministry of Defence Sustainability and Environmental Appraisal Tools Handbook

2.3 STAGE 2 - APPROPRIATE ASSESSMENT

2.3.1 Introduction

Stage 2, Appropriate Assessment involves analysing the likely effects of the draft Plan on European sites. The main objective of the appropriate assessment stage is to determine whether the draft Plan (either alone or in combination with other plans and projects) impacts the integrity of a European site with respect to the site's structure, function and its conservation objectives. Hereafter reference to 'site' refers to a European site as part of the Natura 2000 network.

2.3.2 Methodology

In addition to the Habitats Directive and the European Communities (Natural Habitats) Regulations, SI 94/1997, there are a number of guidance documents outlining the approach to undertaking an appropriate assessment. No formal guidance, to date, has been published by the Department of the Environment, Heritage and Local Government in relation to Appropriate Assessment. The following are the main guidance documents that should be referred to. A full complete list can be found in **Section 5,** References.

- Managing Natura 2000 Sites - The provisions of Article 6 of the Habitats Directive 92/43/EEC. European Commission (2000) *or for short (MN, 2000)*

- Assessment of Plans and Projects Significantly Affecting Natura 2000 sites - Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC. European Commission (2001) *or for short (AP, 2001)*

- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC - Clarification of the Concepts of: Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence, Opinion of the Commission. European Commission (January 2007).

- Appropriate Assessment of Plans. Authors: Scott Wilson, Levett-Therivel Sustainability Consultants, Treweek Environmental Consultants and Land Use Consultants (September 2006) *or for short (AA, 2006).*

Stage 2 can be split into five steps as outlined in **Table 2.1.**

Table 2.1 Steps involved in an Appropriate Assessment

Steps	Content	Explanation
2a	Analysis of the site(s) and the reasons for their designation. Identification of underlying trends affecting the site(s)	Three parts 1. Ecological processes and functions affecting the site. 2. Qualifying feature of the site. 3. Relevant trends affecting the site.
2b	Analysis of the plan	What are the key components of the plan.
2c	Analysis of other plans and projects that could contribute to in-combination effects	What are the key components of other plans and projects that could contribute to in combination effects.
2d	Analyse how the plan – in combination with other plans – and the site(s) will interact when the plan is implemented	Perform and analyse on how the plan will interact with the other plans and projects.
2e	If applicable, propose and assess mitigation measures	Should adverse effects be identified mitigation measures where applicable will need to be proposed.

Source: Appropriate Assessment of Plans, 2006

At the commencement of Stage 2 further sites in the list generated may be removed as information develops on the plan and it is possible to demonstrate that no adverse impact occurs.

2.4 STAGE 3 - ASSESSMENT OF ALTERNATIVE SOLUTIONS

If the draft Plan is shown to have an adverse effect on European sites, an assessment of alternative solutions is used to examine alternative ways of achieving the aims of the draft Plan that avoid the adverse impacts the draft Plan would have had on European sites.

2.5 STAGE 4 - NO ALTERNATIVE SOLUTIONS

If it is deemed that there are no alternative solutions and that adverse impacts remain, the draft Plan may proceed (where compensatory measures have been put in place) for imperative reasons of overriding public interest (IROPI).

3 SCREENING OF DRAFT PLAN – STAGE 1

3.1 INTRODUCTION

The draft Plan outlines a number of potential water sources and provides detailed information on a wide range of reasonable options that would be technically capable of supplying the Dublin Region with the required 300 (Ml/d). These options are shown in **Figure 3.1** and further outlined in **Section 3.3.** A number of the options under consideration include abstraction of water from a source that is designated as either a Special Area of Conservation (SAC) and/ or a Special Protection Area (SPA).

The Screening Process is required to establish which option or combination of options would have the potential to affect a European site.

3.2 METHODOLOGY

For the purposes of this HDA of the draft Plan, the Screening Stage was spilt into three phases as describe below.

3.2.1 Phase I

Phase I of the HDA Screening Stage will be comprised of the following:

- An outline of the options proposed for the draft Plan;
- An outline of the characteristics of the draft Plan that could potentially affect the European sites;
- An outline of other Plans/ Programmes/ Projects that could have adverse effects on the European sites within the draft Plan study area;
- Identification of the European sites within the draft Plan study area; and
- Identification of the European sites within a 15km radius of the outer boundary of the draft Plan study area.

3.2.2 Phase II

Phase II involved consideration of the potential for adverse impacts on the integrity of the sites, in light of implementation of the draft Plan and the distance of the sites from the infrastructure within the draft Plan study area. This high level assessment was used to eliminate sites on which there will be no significant effect as a result of implementation of the draft Plan. A screening matrix will be used in this phase of Screening.

3.2.3 Phase III

Phase III involved the exclusion of additional sites within the HDA study area where it can be concluded that there will be no potential for significant adverse effects on the integrity of the sites based on the use of the **Source - Pathway - Receiver** model. In this case the **Source** would be the draft Plan and its components, the **Pathway** would be the type of deterioration/ disturbance anticipated and the **Receiver** would be the Qualifying Feature of the sites.

The conclusion of Phase III of the Screening Stage, will be a list of European sites for which it cannot be definitively determined that there would be no potential for a significant adverse impact to result from implementation of the draft Plan.

3.3 PHASE I SCREENING

3.3.1 Options within Draft Plan

A summary of the options (A-J) outlined within the draft Plan are presented in **Table 3.1** with a summary of the key infrastructure required for each option detailed in **Table 3.2**.

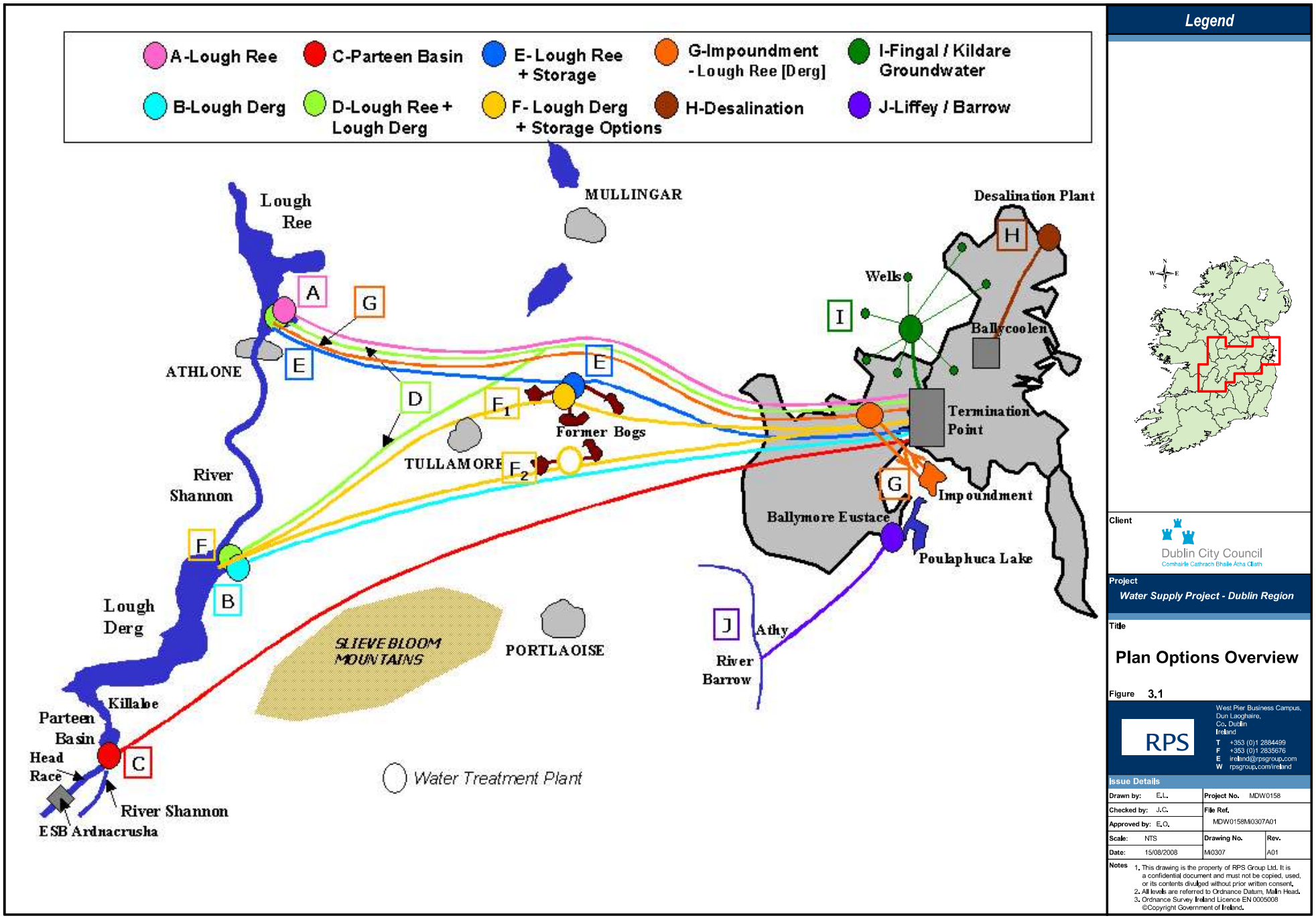
Table 3.1 Summary of Options Outlined within the draft Plan

Water Source	Ref.	Options	Summary Details
Shannon	A	Lough Ree	Potential maximum abstraction of 350 Ml/d Abstraction Pipe, Pump House, Water Treatment Plant and Twin Transmission Pipeline of approx 104km required.
Shannon	B	Lough Derg	Potential maximum abstraction of 350 Ml/d. Abstraction Pipe, Pump House, Water Treatment Plant and Twin Transmission Pipeline of approx 122m required.
Shannon	C	Parteen Basin	Potential maximum abstraction of 350 Ml/d. Abstraction Pipe, Pump House, Water Treatment Plant and Twin Transmission Pipeline of approx 158km required.
Shannon	D	Lough Ree & Lough Derg	Potential maximum abstraction of 350 Ml/d. Abstraction Pipe, Pump House, Water Treatment Plant and Twin Transmission Pipeline of approx 171km required. Pipeline constructed in two phases approximately 10 years apart. Phase 1 requirement of 250Mld from Lough Ree and Phase 2 requirement of 104Mld from Lough Derg.
Shannon & Groundwater	E	Lough Ree & Groundwater & Storage	Abstractions from Lough Ree to be pumped to a former cutaway bog land area site near Rochfortbridge. Part of the former cutover bog is being quarried for sand and gravel deposits. Abstractions of up to 500Mld between November and July the following 4 months abstractions of 50Mld. Four months of storage supply will be available. This storage can ensure that abstractions from Lough Ree are minimised during low flow periods on the Shannon. Abstraction Pipe, Pump House, Water Treatment Plant and Transmission Pipeline of approx 104 km required.
Shannon & Groundwater	F1	Lough Derg & Groundwater & Storage	Abstraction from Lough Derg to be pumped to a former cutaway bog land area site near Rochfortbridge, same location as Option E. Abstractions of up to 410Mld for ten months of the year and 2 months of 50Mld. Abstraction Pipe, Pump House, Water Treatment Plant and Transmission Pipeline of approx 127 km required. Abstraction will vary depending on usage of storage.
Shannon	F2	Lough Derg & Storage	Abstraction from Lough Derg to be pumped to a former cutaway bog land area site near Clonygowan. Abstraction Pipes, Pumping Station and Booster, Transmission Pipelines, Water Treatment Plant. Abstraction will vary depending on usage of storage. Pipeline length is 122km
Shannon	G	Lough Ree or Lough Derg & Impoundment	Abstraction from Lough Ree or Lough Derg to impounded in the Wicklow Mountains. Abstractions of up to 420Mld from Lough Ree between the months of November and July and abstractions of 60Mld for the remaining months. Storage will be available for up to 4 months average supply requirement. Abstraction Pipes, Pumping Station and Booster, Transmission Pipelines of approx 113km, Water Treatment Plant, plus a dam required for the impoundment.
Irish Sea	H	Desalination	Potential maximum abstraction of 300 Ml/d. Abstraction Pipe, Desalination Plant and Transmission Pipeline of approx 25km required.
Groundwater	I	Fingal/ Kildare Groundwater (will have to be combined with	Abstractions of water from groundwater sources in Fingal and Kildare and piping of groundwater to suitable locations for treatment and introduction to public water supply systems.

Water Source	Ref.	Options	Summary Details
		one or more other options)	
Rivers Liffey & Barrow	J	Liffey/ Barrow (will have to be combined with one or more other options)	Abstractions of water from both the Upper Liffey and Barrow. Abstraction of water from the River Barrow to Ballymore Eustace water treatment plant, Transmission Pipeline is required.

Table 3.2 Details of the Key Infrastructure Required within the draft Plan

Key Infrastructure	Summary Details
Pipeline (Options A-J)	A pipeline would be required for all the options. The pipeline would connect the abstraction point to the distribution point via a Water Treatment Plant (Option A –G) or a Desalination Plant (Option H). In the case of Option I & J, the pipeline will connect the source directly to the distribution point. The first part of the pipeline would transport raw/untreated water from the abstraction point to either the desalination plant (DP) or water treatment plant (WTP). The second part of the pipeline would convey clear/treated water between the DP or WTP to the distribution network.
Pump House (Options A-G)	A Pump House is a facility where water is pressurised to enable its transportation over long distances. Pumps transmit energy (head) to water so that it can move into the pipeline. Energy is needed to transport water to more elevated/distant locations. A booster pumping station may be required to overcome the energy losses (head losses) during transport.
Water Treatment Plant (Options A-F)	A WTP is a facility where raw water extracted from a natural/artificial water body (lake, river, reservoir, aquifer, etc.) is treated to permit its safe consumption/use. The usual treatment process consists of coagulation, flocculation, settling, rapid sand filtration and disinfection through chlorine.
Desalination Plant (Option H)	Desalination is the process of removing the salts and other chemicals contained in seawater to make it suitable for human consumption. The majority of modern desalination plants use a technique based on water filtration through semi-permeable membranes under high pressure (almost 70 bars), e.g. reverse osmosis. This is an energy demanding process compared to surface water treatment and transport (when available).
Impoundment (Option G)	Impoundment is the storage of water in a man-made reservoir such as behind a dam in a natural valley. The stored water can be used for power generation when it is released through the dam (using turbines).



Legend

Client: Dublin City Council
Comhairle Cathrach Bhaile Átha Cliath

Project: *Water Supply Project - Dublin Region*

Title: **Plan Options Overview**

Figure 3.1

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3.3.2 Technically Feasible Options

The draft Plan initially outlined that there are eleven possible options to supply the Dublin Region with the required volume of 300Ml/D of water. However subsequent analysis in the draft Plan concluded that Option I (Groundwater) and Option J (Barrow/Liffey) individually do not meet the objective of the draft Plan i.e. 300Ml/D. Therefore these two options (I and J) have not been included within the Habitats Directive Assessment Screening Process as they do not represent technically feasible options that could be implemented.

3.3.3 Pipeline Routes

3.3.3.1 Introduction

With regard to the strategic routing of pipelines from each of the options, preliminary desktop assessment work was undertaken to ensure that it is possible to route the pipelines without directly impacting a Special areas of Conservation (SAC) or Special Protection Areas (SPA). The following sections provide an overview of preliminary pipeline corridors for each of the options as shown in **Figure 3.1** and it describes the proximity of the surrounding SAC and SPA sites.

The feasible pipeline options do not cross or impede on any SACs or SPAs within the draft Plan study area, however the abstraction facility of the pipelines for both the Lough Ree and Lough Derg options impact directly on a SAC and SPA. Approximate distance from the proposed pipelines to the SAC or SPA sites are given in brackets after each designated area in names.

3.3.3.2 Route A

The proposed pipeline corridor for Option A connects Lough Ree with a termination point to the southwest of Dublin City. The source of the pipeline, Lough Ree, is designated both as a SPA and SAC. These designations are also given to Lough Ennell (SPA located 2km from pipeline) and Lough Ennell (SAC located 1km from pipeline), which both lie to the north of the pipeline. Split Hills and Long Hill Esker SACs are also bypassed 510m to the north of the potential pipeline corridor.

3.3.3.3 Route B

The pipeline corridor for Option B connects Lough Derg with the termination point, to the southwest of Dublin City. Lough Derg is designated both as a SPA and a SAC. The pipeline avoids two SPAs encountered along the route; the River Little Brosna Callows SPA by 900m, and Dovegrove Callows SPA by 750m, by travelling between the two. The pipeline bypasses north of Kilcarren-Firville Bog SAC by 1km and Ballyduff/Clonfinane Bog SAC by 1.6km, and passes between the two small sections

of the Ridge Road SAC (North:160m, South:100m) southwest of Rapemills. The Clonaslee Esker and Derry Bog SAC, a bend in the River Barrow SAC, and the Mounds Bog SAC, are bypassed by the pipeline to the north by 250m, 220, and 1.35km respectively.

3.3.3.4 Route C

The Option C pipeline corridor connects the Parteen Basin with the termination point, to the southwest of Dublin city. Parteen Basin is designated within the Lower River Shannon SAC. The pipeline follows a line, which bypasses north of the Slievefelim to Silvermines Mountains SPA (by 2.4km) and the Slieve Bloom Mountain SPA (by 2.6km). Other SACs in proximity to the corridor include: Silvermines Mountain West SAC, bypassed to the north by 2.6km; Sharavogue Bog SAC and Lisduff Fen SAC, bypassed to the south by 2km and 870m; Island Fen SAC and Clonaslee Esker and Derry Bog SAC, and Mouds Bog SAC, bypassed to the north by 1.2km, 180m, and 2.2km; and Ballynafagh Bog SAC and Ballynafagh Lake SAC, bypasses to the south by 2.8km and 1.1km.

3.3.3.5 Route D

This route involves a pipeline from both Lough Ree and Lough Derg, which joins along the route corridor for Option A Lough Ree and then travels to Dublin. The section from Lough Ree to the connection near Lough Ennell, where the Lough Derg pipeline connects has already been discussed as part of Option A.

The Lough Derg section of Option D connects Lough Derg (SPA and SAC) with the termination point, to the southwest of Dublin City. This pipeline route avoids River Little Brosna Callows SPA by 900m and Dove Grove Callows SPA by 780m through passing between them. Kilcarren-Firville Bog SAC and Ballyduff/Clonfinane Bog SAC are bypassed to the north 1km and 1.6km respectively, while the two small sections of Ridge Road SAC (North:160m, South:100m) southwest of Rapemills, are bypassed through the middle. Outside Tullamore, Charleville Wood SAC is bypassed 670m to the west and the eastern limits of the Split Hills and Long Hill Esker SAC is bypassed by 550m, before this route joins the same projection as Option A near Lough Ennell.

3.3.3.6 Route E

The pipeline corridor for Option E connects Lough Ree SPA & SAC with water storage facilities in a former bog near Rochfortbridge, Co. Westmeath. The pipeline corridor then extends to a termination point to the southwest of Dublin City. The proposed pipeline bypasses Carn Park Bog SAC by 3.8km, Split Hills and Long Hill Esker SAC by 270m, and Raheenmore Bog SAC by 2km to the north, while avoiding Lough Ennell (SAC by 4.7km; SPA by 5.4km).

3.3.3.7 Route F1

The Option F pipeline corridor connects Lough Derg SPA & SAC with the termination point outside Dublin with water storage facilities at Rochfortbridge. The pipeline bypasses the River Little Brosna Callows SPA by 900m and All Saints Bog SPA/SAC by 2km to the south. Dovegrove Callows SPA is also bypassed by 750m to the north. The proposed pipeline bypasses Kilcarren-Firville Bog SAC by 1km Ballyduff-Clonfinane Bog SAC by 1.6km, Charleville Wood SAC by 670m, and Raheenmore Bog SAC by 2km, to the north; and All Saints Bog and Esker SPA/SAC by 2.1km and Split Hills and Long Hill Esker SAC by 2.1km, to the south. The pipeline passes between the two small sections of the Ridge Road SAC (North: 160m, South: 100m), southwest of Rapemills.

3.3.3.8 Route F2

Option F2 proposed pipeline connects Lough Derg SPA/SAC/pNHA with the termination point outside Dublin via water storage facilities west of Portarlington. The first 21km the corridor follows the same route as Option F1, bypassing Kilcarren –Fiville Bog SAC/pHNA by 1km, Arragh More Bog NHA by 2km, Ballyduff-Clonfinbatne Bog SAC/pNHA by 1.6km, and Killeen Bog NHA by 2km. These designated sites are located to the north of the pipeline. The proposed pipeline also passes to the south of Friar'S Lough pNHA by 1.2km, Lorrha Bog NHA by 850m, River Little Brosna Callows SPA/NHA by 900m, All Saints Bog and Esker SPA/SAC by 2km and Dovegrove Callows SPA by 750m.

After crossing N62 north of Birr town, Option F2 diverges from Option F1. It bypasses Clonaslee Eskers and Derry Bog SAC/pNHA by 250m to the north, and Annaghmore Lough Fen pNHA by 40m to the south. The route then continues east, bypassing the Slieve Bloom Mountains SPA by 1.6km and River Barrow and River Nore SAC by 30m at its closest point.

The pipeline corridor crosses the Grand Canal pNHA three times: at Grand Canal Barrow Line southwest of Rathangan town, at Grand Canal Supply (Milltown Feeder) southwest of Kilmeage town and at Grand Canal south of Prosperous town. It also bypasses Mouds Bog pNHA/SAC by 1.4km to the south.

3.3.3.9 Route G

Option G involves the abstraction from Lough Ree SPA & SAC with impoundment in the Wicklow Mountains. The pipeline corridor as far as the termination point south west of Dublin City follows the same corridor as that for Option A. The pipeline corridor from the termination point to the Wicklow Mountains does not directly impact on an SAC or SPA but comes within approximately 2.6km from Wicklow Mountains SAC.

3.3.3.10 Route H

The pipeline corridor for Option H is relatively short in comparison with Options A to G and bypasses Rogerstown SPA by 1.2km and the most inland point of Rogerstown Estuary SAC by 6m. Broadmeadow/Swords Estuary SPA is bypassed by 2.6km while the Malahide Estuary SAC is bypassed by 2.3km to the west. The pipelines origin is 1.5km south of Skerries Islands SPA.

3.4 IN COMBINATION WITH OTHER PLANS AND PROJECTS

3.4.1 Introduction

As previously stated in **Section 1.3**, the Habitats Directive Article 6(3) states that if there is a likely significant effect on a European site "individually or in combination with other plans or projects" that a HDA should be undertaken. This section identifies the hierarchy of relevant Plans and Policies and in addition it provides details on relevant Plans and Projects that have potential to interact with this draft Plan. A draft Hierarchy of Plans and Programmes in which the Water Supply Project – Dublin Region (draft Plan) is placed in context is outlined in **Figure 3.2.**

3.4.2 International/ EU Level

3.4.2.1 Water Framework Directive

As part of a substantial restructuring of EU water policy and legislation, a Directive establishing a new framework for Community action in the field of water policy (2000/60/EC) was agreed by the European Parliament and Council in September 2000 and came into force on 22nd December 2000. The Directive, generally known as the Water Framework Directive (WFD), rationalises and updates existing water legislations and provides for water management on the basis of River Basin Districts (RBD's).

The main activities for the implementation of the WFD will take place in the context of River Basin Management Plans led by local authorities. The Department of the Environment, Heritage and Local Government is promoting the establishment by local authorities of such projects to address all inland and coastal waters.

3.4.3 National

3.4.3.1 Water Services Act, 2007

The Water Services Act, 2007 provides an updated framework for delivery of water services by Water Services Authorities in Ireland under the supervision of the Department of the Environment, Heritage and Local Government (DEHLG). The Act provides that a Water Services Authority may provide water services or supervise the provision of water services by other persons taking account of:-

- *Proper planning and sustainable development in its functional area*
- *Protection of human health and the environment*
- *Relevant Regulations and other strategy provisions made by the Minister or the Parliament and Counsel of the European Union*
- *Relevant Regulations made by the Minister for Health and Children*
- *Relevant Policy directions issued by the Minister under this Act or any other enactment*
- *Guidance provided or direction made by the Agency (EPA)*
- *Sustainable management of water resources*
- *Relevant Development Plans, Regional or Spatial Planning Guidelines, Housing Strategies or special amenity area orders, as appropriate, made under the Act of 2000 (Planning Act)*
- *A Water Quality Management Plan or a programme of measures made under the Local Government (Water Pollution) Acts 1977 – 2007 for the area to be covered by the Water Services Strategic Plan*
- *A Waste Management Plan under the Act of 1996 (Waste Act), a river basin management plan or a programme of measures under the EU Water Framework Directive; or*
- *Such other criteria, standards or procedures as may be prescribed or as may be directed by the Minister.*

The Act provides that a Water Services Authority may provide water services outside of its functional area and may provide assistance to any water services provider to facilitate the provision of water services. In addition, two or more Water Services Authorities may, and shall at the request of the Minister, jointly provide, or arrange for the provision of, Water Services in all or part of their joint or respective areas.

3.4.3.2 National Spatial Strategy

The National Spatial Strategy (NSS) 2002-2020, sets out a twenty year planning framework designed to achieve a better balance of social, economic, physical environment and population growth and regards water supply as an important service. Infrastructure such as water services are dealt with in the strategy in relations to particular locations and are needed to support balanced regional development with the minimisation of consumption of this non-renewable resource. The NSS is what dictates development in Ireland and is referenced within all Local Authority Development Plans.

The NSS sets out a strategy for dealing with water with regard to gateways and hubs including city-scale water services and effective water service arrangements. Under the strategy, hinterland areas will require cost effective water services with an overall environmental goal of high quality water resources in rives, lakes, groundwater and offshore.

A framework within the NSS aims to ensure that key aspects in rural areas such as water quality are protected to support quality of life and economic vitality in rural settlements and housing. A hierarchy of access to social infrastructure deals with integrating policies dealing with where people live and work with appropriate environmental considerations such as the availability of good quality water services.

The River Shannon and its lakes, combined with the canals systems are noted in the NSS as providing a network for inland travel by water from Wexford to Donegal. The recreational and tourism potential of this water in all its aspects can support the reinforcement of this area and underpin the attractiveness of the Athlone /Tullamore /Mullingar gateway in particular. Water services and quality is seen as a key element of service infrastructure in the NSS.

Figure 3.2 Draft Hierarchy of Plans and Policies

International/EU Level	EU Water Framework Directive
	SEA Directive
	Floods Directive
	Kyoto Protocol
	Groundwater Directive
	Habitats Directive
	Birds Directive
	Stockholm Convention
	Freshwater Fish Directive
	Drinking Water Directive
	Bathing Water Directive
	EIA Directive
	Sevesco Directive
	Sewage Sludge Directive
	Urban Waste Water Treatment Directive
	Nitrates Directive
	IPPC Directive
	Plant Protection (Products) Directive
	Soils Directive
National Level	National Development Plan
	National Spatial Strategy
	National Climate Change Strategy (2007 –2012)
	Other National Strategies
Regional Level	River Basin Management Plans
	Water Supply Project - Dublin Region draft Plan
	Regional Planning Guidelines
	Regional Development Strategies/Plans
	Flood Risk Management Plans
	Regional Waste Management Plans
	Groundwater Protection Schemes
Local Level	County Development Plans
	Heritage/ Biodiversity Plans
	Local Area Plans, Area Action Plans
Project Level	Environmental Impact Assessment
	Discharge Licences
	IPPC Licences
	Planning Permissions

Influencing Predetermined Conditions

3.4.3.3 River Basin Management Plans

River Basin Management Plans are required under the WFD, as previously outlined.

The primary objective of the WFD is to maintain the "high status" of waters where it exists, prevent deterioration in existing status of waters and to achieve at least *"*good status*"* in relation to all waters by 2015. River Basin Management Plans will identify overall environmental objectives to be achieved within the Plan period (by end 2015). These objectives are set from European WFD and subsequent national legislation. To achieve these overall objectives the River Basin Management Plans (RBMPs) will set specific objectives for each water body and provide a Programme of Measures to be implemented in order to achieve the objectives. These measures will be an important consideration for the implementation of any options within the Water Supply Project – Dublin Region (draft Plan).

In 2009 it is programmed that the first River Basin Management Plans for the Country of Ireland will be published. The RBMPs will be re-addressed in 2015 in order to see if they have achieved the environmental objectives set out in first RBMPs. The RBMPs will be re-published with any revised Programme of Measures.

This Water Supply Project – Dublin Region draft Plan will have regard to the controls on the abstraction and impoundment of water as developed in the RBD Programme of Measures expected to be published in December 2008. The present on-going consultation with the relevant River Basin Districts is essential to achieving this.

3.4.3.4 Management Plans for European Sites

It is an aim of the National Parks and Wildlife Service (NPWS) to draw up conservation management plans for nature conservation areas, including European designated sites. The plans include a description of the site and a management framework outlining the objectives and strategies with habitats being identified through maps and text. The NPWS are currently working on compiling plans for SACs including updating and re-formatting old conservation plans, as well as writing new plans. Other work includes the commencement of the management planning for designated rivers.

3.4.4 Regional and Local

3.4.4.1 River Dodder Flood Risk Management Plan

The overriding purpose of the River Dodder Catchment Flood Risk Assessment and Management Study (CFRAMS) is to assess and map the spatial extent and degree of flood hazard and risk within the Dodder Catchment, examine future pressures that could impact on flood risk, and develop a long-

term strategy for managing flood risk that is economically, socially and environmentally sustainable i.e. a Catchment Flood Risk Management Plan (CFRMP). The main draft environmental objectives of the plan are:

- Reduce flood risk to people, property and the environment;
- Protect human health and population by minimising the effects of flooding on key community services, sectors and infrastructure;
- Maintain and improve water quality standards, support the achievement of good ecological status/potential under the EU Water Framework Directive; and
- Promote sustainable land use by recommending areas to be free from development.

It is expected that the draft River Dodder CFRMP and associated SEA will be published and tabled for public consultation in approximately January 2009.

3.4.4.2 Fingal East Meath Flood Risk Management Plan

The Fingal East Meath Catchment Flood Risk Management Study (FEM FRAMS) commenced in May 2008. The objectives of this study are similar to the River Dodder CFRAMS and the draft CFRMP and associated SEA are expected to be tabled for public consultation mid 2010.

3.4.4.3 Catchment Flood Risk Assessment and Management Studies

Catchment Flood Risk Assessment and Management Studies (CFRAMS) and Catchment Flood Risk Management Plans (CFRMPs) are the core of this new national policy for flood risk management and the strategy for its implementation. These studies have been developed to meet the requirements, as understood at the present time, of the EU Directive on the assessment and management of flood risks which was adopted in October 2007 (the 'Floods Directive'). This directive currently awaits transposing into National Legislation.

The 'Floods Directive', which is aimed at reducing and managing flood-related risks to human health, the environment, infrastructure and property and links closely to the implementation of the Water Framework Directive, will require EU Member States to develop a preliminary Flood Risk Assessment including flood risk maps for all river basins/catchments.

A CFRAMS for the Shannon will have to be developed with associated SEA. The main objectives of this will be to:

- Assess the spatial extent and degree of flood hazard and risk within the Catchment,
- Examine future pressures that could impact on flood risk, and

- Develop a long-term strategy for managing flood risk that is economically, socially and environmentally sustainable.

3.4.4.4 Dublin Region DRAFT Water Services Strategic Plan

The Dublin Region DRAFT Water Services Strategic Plan for the GDA is currently being developed and will represent a common strategy across the region in respect of water supply, wastewater and storm-water management between now and 2030. This timeframe correlates well with the GDA's 2011-2031 water supply strategy. An integrated approach is required to deliver water supply and drainage services for the GDA for the following two reasons:

- Existing water supply and drainage infrastructure is integrated to a significant degree across the Dublin Local Authorities and extending into certain areas of Counties Wicklow, Kildare and Meath, but there is potential for more integration.

- The existing and future water services requirements in these areas can most effectively and economically be delivered by an integrated approach based on common standards, policies and programme of measures.

The Dublin Region Draft Water Services Strategic Study will seek to provide objective assessment of present and future needs.

3.4.4.5 Greater Dublin Strategic Drainage Strategy

The Greater Dublin Strategic Drainage Study (GDSDS) was a strategic analysis of the existing and the future foul and surface water systems requirement in the seven local authority areas in the greater Dublin Region. It sets out the regional approach to drainage planning in line with the current legal requirements and to provide consistent standards to apply throughout the region.

One of the main study objectives was to develop an environmentally sustainable drainage strategy for the region capable of meeting future needs. One of its key strategy recommendations of the GDSDS is the development of a regional wastewater treatment plant on the Donabate and Portrane peninsula. Another of its major recommendations is the development of an orbital sewer to transport wastewater to the regional plant.

One of the major objectives of the GDSDS is the drainage strategy for the Study Area up to 2031 and beyond. In general terms, creation of this strategy involves (p. 12, GDSDS, Final Strategy Report):

- Defining, to an appropriate level of accuracy, the future development scenarios for the area;

- Comparing the drainage requirements to service these scenarios with existing and currently planned drainage infrastructure;
- Identifying the feasible options for optimising known drainage infrastructure and future drainage requirements to meet any shortfalls in service; and
- Selecting the preferred option and identifying how it will be implemented, in terms of projects, programmes, financing and procurement.

3.4.4.6 County Development Plans

The draft Plan encompasses directly a number of Counties which include; Carlow, Cavan, Clare, Dublin City, Dun Laoghaire-Rathdown, Fingal, Galway, Kilkenny, Kildare, Laois, Leitrim, Limerick, Longford, Louth, Meath, Monaghan, North Tipperary, Offaly, Roscommon, South Dublin, South Tipperary, Waterford, Westmeath, Wexford and Wicklow. **Table 3.3** summarises the key policies of the encompassed counties detailing development plans regarding water abstraction, water needs, water pipelines, water treatment, storage of water and water conservation.

Table 3.3 Summary of Key Policies of County Development Plans

County	Development Plan
Carlow	**County Development Plan 2003**
• Ensure that adequate water supplies are available. • Existing and future services are used to the optimum efficiency. • All new water supply connections to be metered. Carlow Rural Water Strategic Plan 2001 • Provide water supplies as far as possible to meet the residential, commercial, industrial, agricultural and tourism needs of the county. • Increase water treatment and storage capacity at Rathvilly so as to facilitate development and growth throughout the county. Waterways • Development will be strictly controlled in vicinity of the inland waterways of the county. Planning Authority will not permit development on closed canal/railway lines in order to facilitate greenways/reopening in future.	
Cavan	**County Cavan Development Plan 2003-2009 (water and sanitary services aims)**
• Provide adequate supply of water of suitable quality for domestic, industrial, agricultural and other users. • Provide systems for the safe and adequate disposal of sewage and other water-borne wastes. • Provide the supporting infrastructure for sustainable urban development within a planned landuse framework. • Support the implementation of Strategic Rural Water Plan for County Cavan 2001/2002.	
Clare	**Clare County Development Plan 2005 (Chapter 3 Infrastructure)**
• Have regard to the water services investment programme to ensure development has access to a safe and sufficient public water and sewage infrastructure. • Concentrate infrastructural investment and improvement in those areas where the provision of water services infrastructure will benefit development.	
Dublin City	**Dublin City Development Plan 2005-2011**
• Ensure the development of water systems and to provide for the expansion of water systems to meet anticipated demand including areas with poor water pressure and to provide long-term emergency supplies for the city and region. • Take all necessary steps to ensure that the quality of treated water supplied to all of its customers is in compliance with the Water Quality Directives of the EU and national legislation.	

County	Development Plan
Dun Laoghaire-Rathdown	**Dun Laoghaire-Rathdown County Council Development Plan 2004-2010 (Policy ES1: Water supply and drainage)**

- Provide adequate high quality drinking water and to continue the development and improvement of the water supply and drainage systems throughout the county to meet the anticipated water and drainage requirements of the area.

Fingal	Fingal Development Plan 2005-2011 (Policy UTP1-4)

- To continue the development and upgrading of the water supply system to ensure that an adequate supply of drinking water for domestic, commercial, industrial and other uses, is available for the sustainable development of the county.
- To continue the upgrading and rehabilitation of water main systems.
- To protect and develop, in a sustainable manner, the existing groundwater sources and aquifers in the county and to control development in a manner consistent with the proper management of these.
- To introduce Water Byelaws for the purpose of protecting the public drinking water supply against contamination from a customer's system and promotion of internal water conservation.

Galway	Galway County Development Plan 2003-2009

- High standard of water and sewage infrastructure is fundamental to achieving orderly sustainable development compatible with the recommendations of the draft County Galway Settlement Strategy.
- Provide and maintain quality water and wastewater services necessary for environmental purposes, and for economic, regional and rural development purposes.

Kilkenny	Kilkenny County Council Development Plan (water supply policy)

- To implement the recommendations of the Kilkenny Water Supplies strategic Review.
- Extend water supplies to meet the expanding domestic commercial and industrial needs of the County.
- Improve the provision of services in those areas where deficiencies exist at present.
- Encourage the economic use of existing service.
- Conserve valuable water supplies by eliminating leakages.
- Conserve and protect sources of supply through the application of the principles of sustainability in their development and controlling development in their vicinity, which would give rise to adverse impacts.

Kildare	Kildare County Development Plan 2005-2011 (objectives 3.2.3)

- To improve the provision of services in those areas of the County where deficiencies exist at present.
- To preserve the capacity of water and wastewater services primarily for the use of developments within County Kildare, particularly in those areas under pressure from the Dublin Metropolitan area subject to an agreement with the adjoining local authorities.
- To provide surface water management systems throughout the County and alleviate flooding areas.
- To implement a planned programme in support of the rural settlement strategy.

County	Development Plan
Laois	**Laois County Development Plan 2006-2012 (ENV2 water and waste water provision)**

- "Pursue a physical development strategy that optimises existing and proposed water and wastewater infrastructural investment;
- Concentrate infrastructure improvement and provision in the areas in which the greatest shortfall and the greatest potential for residential industrial and commercial growth exist at present;
- Assess all proposals in the light of the available infrastructural facilities in the development area, and to prohibit those developments that would put undue pressure on the available water and wastewater facilities. In areas of inadequate water pressure developers may be required to provide auxiliary pumping facilities;
- Refuse permission, even permission in principle, for developments which will not have adequate wastewater disposal facilities available to them within a reasonable period to ensure an orderly expansion of the urban areas and in order to avoid making premature commitments of land;
- Encourage water conservation, to minimize wastage, and protect sources by reducing the requirement for water abstraction and treatment;
- Discourage the use of pumping stations for technical and environmental reasons".

Leitrim	Leitrim County Development Plan 2003-2009 (Objectives 10.1a-10.1f)

- "Complete and extend the North Leitrim Regional Water Supply Scheme to cater for the demands of Manorhamilton, Drumahaire, Drumkeerin and all existing and proposed group water schemes capable of being supplied by the scheme.
- Implement in full the objectives of the Rural Water Strategic Plan for County Leitrim.
- Implement the proposals outlined in the Design Review report on the extension and upgrading of the South Leitrim Regional Water Supply Scheme.
- Implement in full the Kinlough/Tullaghan Water Supply Improvement Scheme.
- Implement the Water Services Pricing Policy.
- Implement the terms of the Water Services Pricing Policy in relation to water supply."

Limerick	Limerick County Development Plan 2005-2011 (Policy INF 18-20, 22,23)

- "Facilitate the provision and upgrading of water supply and sewage schemes throughout the county in accordance with the settlement structure identified in this plan as finances permit".
- "Promote and support proposals in line with the *"Initiatives for Water Services in Small Towns and Villages"* scheme for small-scale sewerage treatment and water works in towns and villages lacking in adequate treatment facilities".
- All site assessments for all on-site treatment systems or septic tanks should be carried out in accordance with the EPA guidelines and regulations.
- "In all applications for development where public mains are available or likely to be available, the developer will be required to connect into them".
- "Co-operate, encourage and advise in the provision of group-water schemes in the County".

County	Development Plan
Longford	**Longford County Development Plan 2003-2009 (Aims 4.6.1)**
• Expand existing services in a planed and prioritised fashion and facilitate development of additional services where economically feasible and where resources permit, providing for the development of the county in an orderly and sustainable manner. • Ensure that the drinking water supply complies with relevant EU drinking water standards and to extent supply, where necessary and where resources permit, to meet demand. • Protect valuable ground water sources and important surface water bodies from pollution through infiltration by domestic, agricultural or other sources effluent/pollutant material. • Implement, where appropriate and subject to planning and environmental criteria, the objectives of the Midlands Waste Management Plan as adopted.	
Louth	**Louth County Development Plan 2003-2009 (Policy P 9.3)**
• Implement water protection measures to prevent any deterioration of 'good status' waters and to restore unsatisfactory waters to 'good status'. • Introduce a comprehensive and integrated approach to the management of our natural water resources. • Ensure the provision of modern sewerage treatment systems in towns and villages that have insufficient capacity to meet current and future needs where they do not meet modern standards and where they represent a pollution risk to local watercourses. • Raise public awareness of water quality issues and the measures required to protect it by providing useable and accessible information to the public on water quality in the county. • Require developers to submit sustainable urban drainage systems (S.U.D.S.) based designs for the management of surface water from new developments. Such designs shall endeavour to maintain runoff from developed site at pre development "greenfield" levels.	
Meath	**Meath County Development Plan 2007-2013 (INF OBJ 18-22)**
• "Reduce dependence on the water services infrastructure of adjoining Local Authorities to cater for the projected development needs of Drogheda, East Meath and the Dunshaughlin Area urban centres". • "Implement the Water Services Investment Programme 2005-2007". • "Continue the upgrading and rehabilitation of water main networks". • "Reduce leakage and wastage from the water supply system wherever possible in the interest of achieving efficiency and sustainability". • "Apply Water Pricing to the existing and future non-domestic development in accordance with the Polluter Pays Principle".	
Monaghan	**Monaghan County Development Plan (policies for water services WS 1-7)**
• "Meet the water supply needs of the county through the implementation of the County Monaghan Strategic Water Plan. • Complete the proposals outlined in the Water Services Investment Programme and Assessment of Needs Report 2005-2009, subject to funding. • Improve the quality and capacity of water supply throughout the county in partnership with all stakeholders. • Protect the source and raw water quality of all public and private water supply schemes throughout the county. • Reduce water wastage and unaccounted for water through water conservation measures and improvements to existing infrastructure, including both the public and private sector. • Provide an adequate supply of piped water for fire fighting. • Protect existing aquatic habitats in the case of surface waters".	

County	Development Plan
North Tipperary	North Tipperary County Development Plan 2004-2010

Conservation objectives:

- Reduce water losses
- Maximise value of capital investments
- Improve network management
- Improve customer services
- Improve management of water resources and general environmental protection

Public Water Supply Policy SERV2

- "In granting permission for new development the development shall be connected to the Council water supply, and only in exceptional circumstances will the Council consider group water or single borehole wells".

Offaly	Draft [Feb. 08] County Development Plan 2009-2015

- "Continue to ensure the provision of necessary infrastructural services to support development in accordance with the County's settlement hierarchy without compromising the quality of our natural environment.
- Identify and thereby inform future plans and programmes on the envisaged need for high quality and efficient water supply, drainage and other infrastructure for the plan period.
- Develop and extend water supply schemes to provide a potable water supply where necessary and economically viable".

Roscommon	Roscommon County Development Plan 2002 (Policies)

- Ensure water supply of the County complies with EC drinking water standards and to extend them, where necessary, to meet demand.
- Ensure that water services throughout the County are in accordance with the 'Water Services Investment Programme – Assessment of Needs' which has been adopted by the Council.
- Protect water supply sources and continue to support the aims and objectives of the Lough Derg and Lough Ree Catchment Monitoring and Management Programme.
- Develop and upgrade waste water treatment systems to meet projected demand.
- Upgrade, and if necessary extend drainage networks to meet projected demand.
- Absorb town, village and group water schemes into the regional water supply network.
- Have regard to ground conditions and compliance with the planning authority standards for installation, treatment and maintenance of individual wastewater treatment systems.

County	Development Plan
South Dublin	**South Dublin Development Plan 2004-2010**

Policy WD1:

- "Co-operate with adjoining authorities to continue the sustainable development and improvement of the water supply and drainage system throughout the County to meet the anticipated water and drainage requirements of the area".

Strategy:

- "Continue the sustainable development and improvement of the water supply and drainage systems throughout the County to meet the anticipated water and drainage requirements of the area.
- Conserve and protect surface water catchments and manage catchment areas where appropriate to water drainage infrastructure of the County.
- Implement the provisions of national policy and legislation in the control of water pollution.
- Ensure that existing and proposed developments are not subject to undue risk of flooding".

South Tipperary	South Tipperary County Development Plan 2003

- Take steps to ensure the quality of surface and groundwater, and implement the overriding principle of waste management that the 'polluter pays'.

Policy SERV 3:

- "In granting permission for new homes in the open countryside the house shall be connected to the Council water supply, and only in exceptional circumstances will the Council consider group water or single borehole wells".

Specific service objective:

- To seek a reduction of unaccounted for water from the present level from 54% to 35% by 2006 and to 25% by 2016.

Waterford	Waterford County Development Plan 2005

- "Develop an overall strategic investment plan for the medium to long term, and to set out a programme of works required to meet identified water services needs. Water services needs include drinking water, wastewater disposal and storm water management".

Westmeath	Westmeath County Development Plan 2008-2014

- "Conservation measures include not only the monitoring of usage of water and early detection of leaks but also an awareness programme for consumers."

Guiding Principles:

- The provision of waste water infrastructure should allow for the orderly and planned growth of the locality over a 20 year period.
- Seek to ensure that the protection of water resources and ground waters is a primary consideration in its water services functions.
- Control the design, construction and operation of all waste water infrastructure and assets within the village or community.

County	Development Plan
Wexford	**Wexford Development Plan 2007-2013 (policy WS 1-4)**
• "Provide the County with an adequate and reliable public water supply system from which to accommodate an increase in domestic, commercial and industrial needs. • Improve the quality and reliability of rural water supply schemes. • Continue to implement, monitor and refine the Aquifer Protection Guidelines and prohibit development which would contravene these guidelines. • Prepare and implement a comprehensive Groundwater Protection Policy with the overall aim of preserving the quality of groundwater particularly for abstraction purposes. • Improve the quality of wastewater effluent discharges to meet appropriate wastewater treatment standards including the requirements of European Union Directives.	
Wicklow	**Wicklow County Development Plan 2004-2009 (policy W2-5)**
• "Require developments to connect to public water supplies where such services are adequate or where they will be improved in the future. • Consider the provision (in advance of new or improved public water supplies), of suitable interim private water supply systems where water supply is inadequate. • Provide water storage reservoirs to cater for all domestic and non-domestic needs arising within the catchment area. • Implement the provisions of the River Basin Management Plans (Eastern River and South Eastern River Basin Management Plans) in order to protect the environment, public health and the recreational potential of these water bodies.	

3.4.4.7 Tourism Strategies

In July 2006 the five Regional Tourist Authorities (RTAs) merged with Fáilte Ireland and a new Regional Development Directorate was established to encompass all of the regional functions and activities of the organisation. The five new Regional Development Boards have focussed on development and approving operational plans for the regions and three year Strategic Tourism Development Plans have been established in each region. The Regional Tourism Development Plans 2008-2010 have been developed through a comprehensive and partnership-based process with inputs from a wide range of stakeholders and partners in the public, private and community sector.

The East and Midlands Regional Tourism Development Plan defines the priorities the region's product and service development, destination marketing, and enterprise development in the period 2008-2010. The plans strategic goals include developing and marketing of regions around the themes of:

- Lakelands and Inland Waterways (Lakelands hereafter)
- Equestrian Ireland
- Beyond Dublin
- Heritage Country

The planned actions for the 2008-2010 plan regarding lakesides include:

- Positioning Ireland's central waterways as a distinct offering in the domestic and overseas markets
- Improving the standards of both water and shore-based facilities along the waterways
- Identifying and develop tourist hubs within the region that offer a range of tourist services including good transport links

3.4.5 Project Level

3.4.5.1 Bremore Port (proposed new Dublin port)

An integrated 24-hour deepwater port and logistics centre, away from the existing congested hub of Dublin city, has been proposed by Drogheda Port Company. The site for the new port at Bremore is already rail linked and adjacent to the M1 motorway 20 minutes from Dublin. The port will have 24-hour marine access with facilities to accommodate new short sea shipping services to the UK, Europe, Scandinavia and the Baltic States.

The three-stage project sees phase 1 catering for up to 5 million tonnes of freight and providing a 500m linear quay for container and general cargo handling. The depth alongside will be in the order of 10.5m below CD, with a potential for future deepening to 12m. In the medium to long term, when phase 3 is completed, the total potential capacity is up to 20 million tonnes plus with the potential for expansion.

The Bremore site is seen as the last remaining opportunity for a significant and sustainable new port development along the East coast of Ireland because of its deepwater, low residential density, good intermodal access, and strategic north-south location.

3.4.5.2 Shannon- Erne Waterway

The Shannon-Erne Waterways was re-opened in 1994 after restoration of the canals and locks, restoring the navigation link between the Shannon and the Erne. This waterway consists of 63 km of river, lake and still water canal with 16 locks managed electro-hydraulically by smart cards. Running between Leitrim Village and a point just north of Belturbet, it links the two great waterways of Ireland, the Erne System and the Shannon Navigation. Waterways Ireland state that this has opened up a countryside which few had ever seen and over the last few years this stretch of water has grown in popularity, particularly in the towns and villages along its length.

A small scheme is planned to enlarge an existing stream from the inner lakes of Lough Ree, a short distance up to Glassan village, which would provide safe moorings and good facilities in the village with a number of restaurants, shops, and pubs.

3.4.5.3 Killinure Lough, Westmeath

Westmeath County Council established a Water Project Office, with the approval of the DEHLG, to focus on the delivery of three large capital schemes under the Water Services Investment Programme 2005-2007. The schemes objective was to increase the water and wastewater treatment capacity and provide supporting infrastructure for the development of County Westmeath. These schemes, which are at various stages, include the South Westmeath Regional Water Supply Scheme aiming to provide a new Water Treatment Plant, connect to existing Athlone distribution system and extend to South Westmeath area including Moate, Kilbeggan, Tyrellspass and Rochfortbridge

The proposal for this scheme is to abstract water from Killinure Lough, Lough Ree which commenced by agreement of the Council in June 2006. An abstraction licence has been granted from An Bord Pleanála to the Provisional Water Abstraction Order made on 17th October 2007. This licence will permit the abstraction of 9 million gallons of water per day (41 mega-litres per day) from the Killinure Lough.

The South Westmeath Regional Water Supply Scheme has the potential to conflict with the proposed abstraction plans for the Dublin Region water supply depending on the nature and quantity of the abstraction. This is due to the supply options being abstracted from the same area as the South Westmeath Regional Water Supply Scheme.

3.5 IDENTIFICATION OF EUROPEAN SITES

In order to identify which European sites could be potentially significantly affected by the draft Plan a 15km boundary was placed around the study area boundary of the draft Plan and all of the SACs and SPAs were located within this. The AAP (2006) guidance document states that buffer zones have been used to help identify sites and they “include all sites within 10 or 15km of their authority”. There are 123 SACs and 42 SPAs within the Habitats Directive Assessment Plan area, which includes the 15km radius.

3.5.1 Special Areas of Conservation (SAC)

Table 3.5 provides a list of the SAC sites along with details relating to their size and the Annex I and Annex II species contained within them. **Table 3.4** shows the county abbreviations used in **Table 3.5**. **Figures 3.3-3.7** illustrate the 123 SACs listed.

Table 3.4 Abbreviations used for Counties

Carlow (CW)	Kerry (KY)	Louth (LH)	Tipperary (TY)
Cavan (CN)	Kildare (KE)	Limerick (LK)	Waterford (WD)
Clare (CE)	Kilkenny (KK)	Meath (MH)	Westmeath (WH)
Dublin (D)	Laois (LS)	Offaly (OY)	Wexford (WX)
Galway (G)	Longford (LD)	Roscommon (RN)	Wicklow (WW)

Table 3.5 Special Areas of Conservation Sites within HDA Study Area

* Priority Habitat

Map ID	Site Name	Co	Area (Ha)	Annex I	Annex II
1	Ballinturly Turlough	RN	178	Turlough*	
2	Lisduff Turlough	RN	70	Turlough*	
3	Four Roads Turlough	RN	101	Turlough*	
4	Killeglan Grassland	RN	62	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(important orchid sites)	
5	Glenloughaun Esker	G	6	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(important orchid sites)	
6	Lough Croan Turlough	RN	155	Turlough*	
7	Annaghmore Lough (Roscommon)	RN	250	Alkaline fens	*Vertigo geyeri* (Whorl Snail)
8	Lough Funshinagh	RN	481	Turlough*	
9	Ballynamona Bog and Corklip Lough	RN	245	-Turlough*, -Degraded raised bogs still capable of natural regeneration, -Bog woodland, -Active raised bogs*, -Depressions on peat substrates of the Rhynchosporion	
10	Castleampson Esker	RN	224	-Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(important orchid sites), -Turlough*	
11	Lough Ree	RN WH LD	14371	-Natural euthrophic lakes with Magnopotamion or Hydrocharition-type vegetation, -Alkaline fens, -Old sessile oak woods with Ilex and Blechnum in British Isles, -Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(important orchid sites),	*Lutra lutra* (Otter)

Map ID	Site Name	Co	Area (Ha)	Annex I	Annex II
				-Bog woodland*, -Limestone pavements*, -Degraded raised bogs still capable of natural regeneration	
12	Corbo Bog	RN	207	-Degraded raised bogs still capable of natural regeneration, -Active raised bogs*, -Depressions on peat substrates of the Rhynchosporion	
13	Fortwilliam Turlough	LD	52	Turlough*	
14	River Shannon Callows	RN WH OY G TY	5856	-Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis), -Molinia meadows on calcareous, peaty or clavey-silt-laden soils (Molinion caeruleae), -Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*, -Limestone pavements*	
15	Fin Lough (Offaly)	OY	78	-Alkaline fens, -Hard oligo-mesotrophic waters with benthic vegetation of Chara spp., -Degraded raised bogs still capable of natural regeneration	*Vertigo geyeri* (Whorl snail)
16	Mongan Bog	OY	208	-Active raised bogs*, -Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion	
17	Pilgrims Road Esker	OY	70	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(important orchid sites)	
18	Moyclare Bog	OY	130	-Active raised bogs*, -Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion	
19	Ferbane Bog	OY	153	-Active raised bogs*, -Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion	
20	Crosswood Bog	WH	207	-Active Raised Bog*, -Degraded raised bogs still capable of natural regeneration	

Map ID	Site Name	Co	Area (Ha)	Annex I	Annex II
21	Carn Park Bog	WH	248	-Active Raised Bog*, -Degraded raised bogs still capable of natural regeneration	
22	Brown Bog	LD	77	-Active raised bogs*, -Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion	
23	Lough Forbes Complex	LD	1337	-Active raised bogs*, -Old sessile oak woods with Ilex and Blechnum in British Isles, -Natural euthrophic lakes with Magnopotamion or Hydrocharition-type vegetation, -Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion	
24	Clooneen Bog	LD	215	-Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion, -Bog woodland*	
25	Clara Bog	OY	844	-Bog woodland*, -Active raised bogs*, -Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites), -Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion	*Euphydryas aurinia* (Marsh Fritillary Butterfly)
26	Charleville Wood	OY	378	Old sessile oak woods with Ilex and Blechnum in British Isles	*Vertigo moulinsiana* (Whorl Snail)
27	Ballymore Fen	WH	43	-Transition mires and quaking bogs, -Alkaline fens, -Degraded raised bogs still capable of natural regeneration	
28	Ardagullion Bog	LD	117	-Active raised bogs*, -Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion	
29	Lough Oughter and Associated Loughs	CN	4758	-Natural euthrophic lakes with Magnopotamion or Hydrocharition-type vegetation, -Bog woodland*	*Lutra lutra* Otter

Map ID	Site Name	Co	Area (Ha)	Annex I	Annex II
30	Moneybeg and Castleisland Bogs	WH	364	-Degraded raised bogs still capable of natural regeneration, -Active raised bogs*, -Depressions on peat substrates of the Rhynchosporion	
31	White Lough, Ben Loughs and Lough Doo	WH	116	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	*Austropotamobius pallipes* (White-clawed Crayfish)
32	Lough Bane and Lough Glass	WH	204	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	*Austropotamobius pallipes* White-clawed Crayfish
33	Garriskill Bog	WH	325	-Active raised bogs*, -Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion	
34	Lough Lene	WH	490	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	*Austropotamobius pallipes (*White-clawed Crayfish)
35	Lough Owel	WH	1123	-Hard oligo-mesotrophic waters with benthic vegetation of Chara spp., -Transition mires and quaking bogs, -Alkaline fens	
36	Lough Ennell	WH	1720	-Alkaline fens, -Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	*Lampetra planeri* (Brook Lamprey), *Lutra lutra* (Otter)
37	Split Hills and Long Hill Esker	WH	75	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites)*	
38	Raheenmore Bog	OY	210	-Active raised bogs*, -Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion	
39	River Boyne and River Blackwater	CN MH WH LH	38	-Alkaline fens, -Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*	*Salmo salar* (Salmon), *Lampetra fluviatilis*

Map ID	Site Name	Co	Area (Ha)	Annex I	Annex II
					(River Lamprey), *Lutra lutra* (Otter)
40	Kilconny Bog (Cloghbally)	CN MH	191	-Active raised bogs*, -Degraded raised bogs still capable of natural regeneration	
41	Mount Hevey Bog	MH	484	-Active raised bogs*, -Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion	
42	The Long Derries, Edenderry	OY	30	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites)*	
43	Pollardstown Fen	KE	266	-Calcareous fens with Cladium mariscus and species of the Caricion davallianae*, -Petrifying springs with tufa formation (Cratoneurion)*, -Alkaline fens	Vertigo moulinsiana, *Vertigo geyeri,* *Vertigo angustior* (Whorl Snail)
44	Mouds Bog	KE	591	-Active raised bogs*, -Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion	
45	Ballynafagh Lake	KE	54	-Alkaline fens, -Transition mires and quaking bogs	*Vertigo moulinsiana (whorl snail)* Marsh Fritillary Butterfly
46	Ballynafagh Bog	KE	156	-Active raised bogs*, -Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion	
47	Red Bog, Kildare	KE	36	-Transition mires and quaking bogs, -Natural euthrophic lakes with Magnopotamion or Hydrocharition-type vegetation, -Active raised bogs*	
48	Rye Water Valley/Carton	KE	72	Petrifying springs with tufa formation (Cratoneurion)*	*Vertigo angustior,* *Vertigo moulinsian*

Map ID	Site Name	Co	Area (Ha)	Annex I	Annex II
					a (whorl snail)
49	Dundalk Bay	LH	5236	-Estuaries, -Mudflats and sandflats not covered by seawater at low tide, -Perennial vegetation of stony banks, -Salicornia and other annuals colonizing mud and sand, -Atlantic salt meadows (Glauco-Puccinellietalia maritimae), -Mediterranean salt meadows (Juncetalia maritimi)	
50	Clogher Head	LH	24	-Vegetated sea cliffs of the Atlantic and Baltic coasts, -European dry heaths	
51	Boyne Coast and Estuary	MH LH	630	-Fixed coastal dunes with herbaceous vegetation (grey dunes)*, -Embryonic shifting dunes, -Shifting dunes along the shoreline with Ammophila arenaria (white dunes), -Estuaries, -Mudflats and sandflats not covered by seawater at low tide, -Salicornia and other annuals colonizing mud and sand, -Atlantic salt meadows (Glauco-Puccinellietalia maritimae, -Mediterranean salt meadows (Juncetalia maritimi), -Spartina swards (Spartinion maritimae)	
52	Rogerstown Estuary	D	586	-Estuaries, -Mudflats and sandflats not covered by seawater at low tide, -Salicornia and other annuals colonizing mud and sand, -Mediterranean salt meadows (Juncetalia maritimi), -Fixed coastal dunes with herbaceous vegetation (grey dunes)*, -Shifting dunes along the shoreline with Ammophila arenaria (white dunes), -Atlantic salt meadows (Glauco-Puccinellietalia maritimae), -Spartina swards (Spartinion maritimae)	
53	Lambay Island	D	405	Vegetated sea cliffs of the Atlantic and Baltic coasts	*Halichoerus grypus* (Grey

Map ID	Site Name	Co	Area (Ha)	Annex I	Annex II
					Seal)
54	Malahide Estuary	D	810	-Fixed coastal dunes with herbaceous vegetation (grey dunes)*, -Shifting dunes along the shoreline with Ammophila arenaria (white dunes), -Mudflats and sandflats not covered by seawater at low tide, -Salicornia and other annuals colonizing mud and sand, -Atlantic salt meadows (Glauco-Puccinellietalia maritimae), -Mediterranean salt meadows (Juncetalia maritimi), -Spartina swards (Spartinion maritimae)	
55	Baldoyle Bay	D	539	-Mudflats and sandflats not covered by seawater at low tide, -Salicornia and other annuals colonizing mud and sand, -Atlantic salt meadows (Glauco-Puccinellietalia maritimae), -Mediterranean salt meadows (Juncetalia maritimi), -Spartina swards (Spartinion maritimae)	
56	Ireland's Eye	D	42	-Perennial vegetation of stony banks, -Vegetated sea cliffs of the Atlantic and Baltic coasts	
57	Howth Head	D	375	-Vegetated sea cliffs of the Atlantic and Baltic coasts, -European dry heaths	
58	North Dublin Bay	D	1475	-Mudflats and sandflats not covered by seawater at low tide, -Salicornia and other annuals colonizing mud and sand, -Atlantic salt meadows (Glauco-Puccinellietalia maritimae), -Mediterranean salt meadows (Juncetalia maritimi), -Annual vegetation of drift lines, -Embryonic shifting dunes, -Shifting dunes along the shoreline with Ammophila arenaria (white dunes), -Fixed coastal dunes with herbaceous vegetation (grey dunes)*, -Humid dune slacks, -Spartina swards (Spartinion maritimae)	*Petalophyllum ralfsii* (Petalwort)
59	South Dublin Bay	D	742	Mudflats and sandflats not covered by seawater at low tide	

Map ID	Site Name	Co	Area (Ha)	Annex I	Annex II
60	Bray Head	WW	264	-Vegetated sea cliffs of the Atlantic and Baltic coasts, -European dry heaths, -Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(important orchid sites)	
61	Ballyman Glen	D WW	25	-Alkaline fens, -Petrifying springs with tufa formation (Cratoneurion)*	
62	Knocksink Wood	D Wicklow	90	-Petrifying springs with tufa formation (Cratoneurion)*, -Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*	
63	Glenasmole Valley	Dublin	149	-Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites)*, -Molinia meadows on calcareous, peaty or clavey-silt-laden soils (Molinion caeruleae), -Petrifying springs with tufa formation (Cratoneurion)*	
64	Wicklow Mountains	D WW	32602	-Blanket bog (*active only)*, -Northern Atlantic wet heaths with Erica tetralix, -European dry heaths, -Old sessile oak woods with Ilex and Blechnum in British Isles, -Siliceous rocky slopes with chasmophytic vegetation, -Calcareous rocky slopes with chasmophytic vegetation, -Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani), -Alpine and Boreal heaths, -Natural dystrophic lakes and ponds, -Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea, -Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)	*Lutra lutra* (Otter)
65	Lower River Shannon	LK CE TY	72138	-Estuaries, -Mudflats and sandflats not covered by seawater at low tide, -Coastal lagoons*, -Vegetated sea cliffs of the Atlantic and Baltic coasts, -Salicornia and other annuals colonizing mud	*Lampetra fluviatilis* (river lamprey), Lampetra planeri (brook lamprey)

Map ID	Site Name	Co	Area (Ha)	Annex I	Annex II
				and sand, -Atlantic salt meadows (Glauco-Puccinellietalia maritimae), -Mediterranean salt meadows (Juncetalia maritimi), -Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation, -Sandbanks which are slightly covered by sea water all the time, -Large shallow inlets and bays, -Reefs, -Perennial vegetation of stony banks, -Spartina swards (Spartinion maritimae), -Molinia meadows on calcareous, peaty or clavey-silt-laden soils (Molinion caeruleae), -Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*	*Petromyzon marinus* (sea lamprey), *Salmo salar* (Atlantic salmon), *Tursiops truncates* (bottle-nosed dolphin), *Lutra lutra* (otter), *Margaritifera* (freshwater pearl mussel)
66	Ratty River Cave	CE	0.75	Caves not open to the public	*Rhinolophus hipposideros* (Lesser Horseshoe Bat)
67	Kilkishen House	CE	0.45		*Rhinolophus hipposideros (*Lesser Horseshoe Bat)
68	Danes Hole, Poulnalecka	CE	39	-Caves not open to the public, -Old sessile oak woods with Ilex and Blechnum in British Isles	*Rhinolophus hipposideros (*Lesser Horseshoe Bat)
69	Glendree Bog	CE	340	Blanket bog (*active only)*	
70	Tory Hill	LK	77	-Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites)*, -Calcareous fens with Cladium mariscus and species of the Caricion davallianae*, -Alkaline fens	
71	Glenomra Wood	CE	53	-Old sessile oak woods with Ilex and Blechnum in British Islesm, -Molinia meadows on calcareous, peaty or clavey-silt-laden soils (Molinion caeruleae), -Degraded raised bogs still capable of natural regeneration	

Map ID	Site Name	Co	Area (Ha)	Annex I	Annex II
72	Slieve Bernagh Bog	CE	2144	-Blanket bog (*active only)*, -Northern Atlantic wet heaths with Erica tetralix, -European dry heaths	
73	Loughatorick South Bog	CE G	888	Blanket bog (*active only)*	
74	Pollagoona Bog	CE	28	Blanket bog (*active only)*	
75	Derrycrag Wood Nature Reserve	G	118	Old sessile oak woods with Ilex and Blechnum in British Isles	
76	Pollnaknockaun Wood Nature Reserve	G	81	Old sessile oak woods with Ilex and Blechnum in British Isles	
77	Rosturra Wood	G	39	Old sessile oak woods with Ilex and Blechnum in British Isles	
78	Cloonmoylan Bog	G	554	-Active raised bogs*, -Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion, -Bog woodland*	
79	Barroughter Bog	G	174	-Active raised bogs, -Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion	
80	Lough Derg, North East Shore	G TY	3648	-Taxus baccata woods of the British Isles*, -Juniperus communis formations on heaths or calcareous grasslands, -Alkaline fens, -Calcareous fens with Cladium mariscus and species of the Caricion davallianae*, -Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*, -Limestone pavements*	
81	Ardgraigue Bog	GY	184	-Degraded raised bogs still capable of natural regeneration, -Active raised bogs*, -Depressions on peat substrates of the Rhynchosporion	
82	Redwood Bog	TY	555	-Degraded raised bogs still capable of natural regeneration, -Active raised bogs*, -Depressions on peat substrates of the Rhynchosporion	
83	All Saints Bog and Esker	OY	382	-Bog woodland*, -Active raised bogs*,	

Map ID	Site Name	Co	Area (Ha)	Annex I	Annex II
				-Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites)*, -Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion	
84	Ridge Road, SW of Rapemills	OY	16	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(important orchid sites)	
85	Ballyduff/Clonfinane Bog	TY	270	-Active raised bogs*, -Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion, -Bog woodland*	
86	Kilcarren-Firville Bog	TY	677	-Active raised bogs*, -Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion	
87	Liskeenan Fen	TY	43	-Calcareous fens with Cladium mariscus and species of the Caricion davallianae*	
88	Sharavogue Bog	OY	223	-Active raised bogs*, -Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion	
89	Lisduff Fen	OY	31	-Alkaline fens, -Petrifying springs with tufa formation (Cratoneurion)*	*Vertigo geyeri* (whorl snail)
90	Island Fen	OY	12	-Juniperus communis formations on heaths or calcareous grasslands, -Alkaline fens	
91	Kilduff, Devilsbit Mountain	TY	134	-Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)*, -European dry heaths	
92	Silvermine Mountains	TY	24	-Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)*, -Northern Atlantic wet heaths with Erica tetralix	
93	Silvermine Mountains West	TY	612	-Northern Atlantic wet heaths with Erica tetralix, -Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)*, -European dry heaths,	

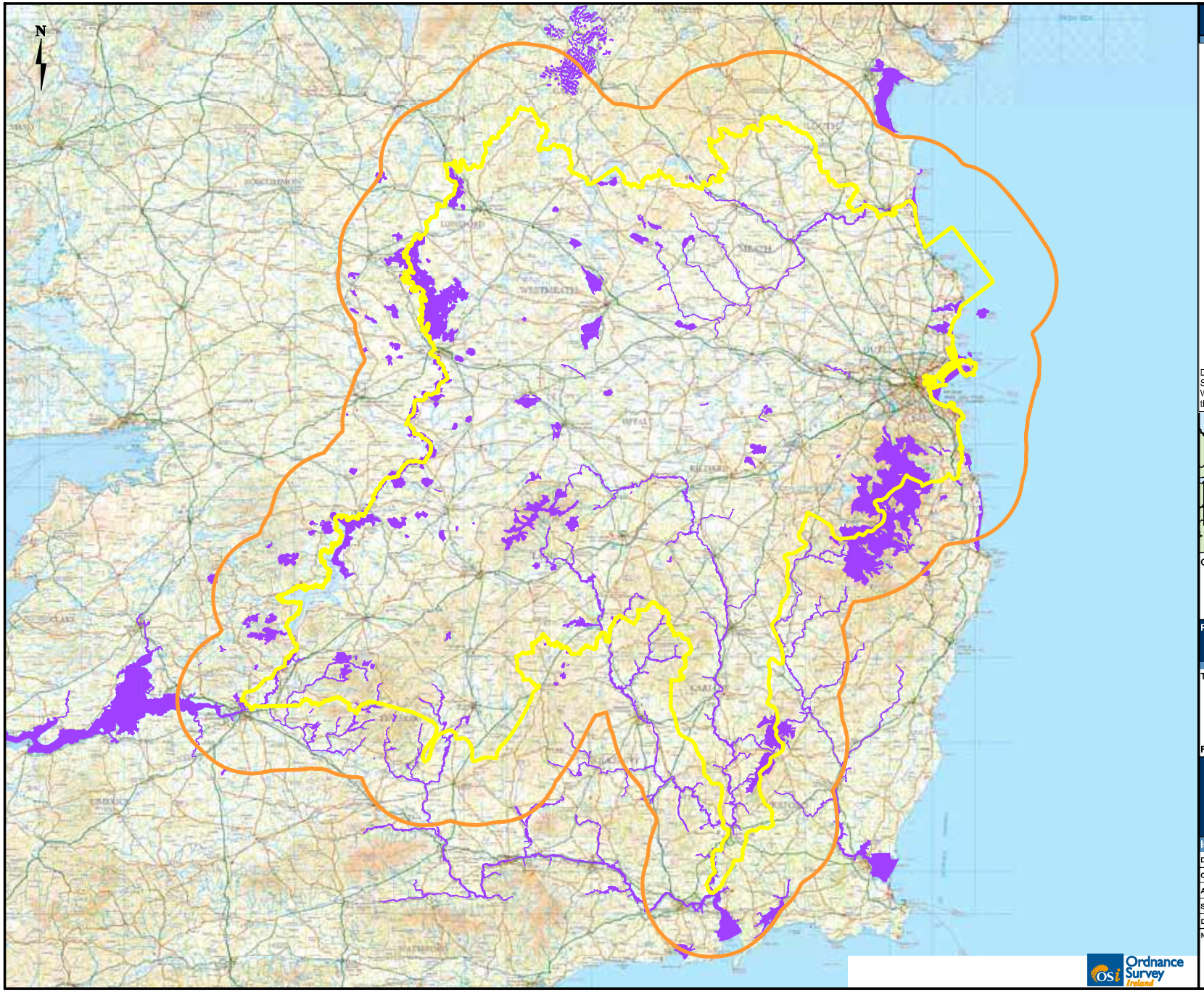
Map ID	Site Name	Co	Area (Ha)	Annex I	Annex II
				-Blanket bog (*active only)*	
94	Bolingbrook Hill	TY	206	-European dry heaths, -Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)*, -Northern Atlantic wet heaths with Erica tetralix	
95	Keeper Hill	TY	414	-Blanket bog (*active only)*, -Northern Atlantic wet heaths with Erica tetralix, -Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)*	
96	Clare Glen	TY LK	24	Old sessile oak woods with Ilex and Blechnum in British Isles	*Trichomanes speciosum* (Killarney Fern)
97	Glenstal Wood	LK	6	Old sessile oak woods with Ilex and Blechnum in British Isles,	*Trichomanes speciosum (*Killarney Fern)
98	Lower River Suir	TY WD KK	3348	-Atlantic salt meadows (Glauco-Puccinellietalia maritimae), -Mediterranean salt meadows (Juncetalia maritimi), -Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation, -Old sessile oak woods with Ilex and Blechnum in British Isles, -Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*, -Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, -Taxus baccata woods of the British Isles*	*Petromyzon marinus* (sea lamprey), *Lampetra planeri (*brook lamprey), *Lampetra fluviatilis* (river lamprey), *Alosa fallax* (twaite shad), *Salmo salar* (Atlantic salmon), *Alosa alosa* (allis shad), *Lutra lutra* (otter), Austropotamobius pallipes *(white-clawed crayfish)*

Map ID	Site Name	Co	Area (Ha)	Annex I	Annex II
99	Philipston Marsh	TY	4	-Transition mires and quaking bogs, -Alkaline fens	
100	Anglesey Road	LK	33	Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)*	
101	River Barrow and River Nore	KK TY LS KE CW WX WD	19124	-Old sessile oak woods with Ilex and Blechnum in British Isles, -Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*, -Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation, -Salicornia and other annuals colonizing mud and sand, -Atlantic salt meadows (Glauco-Puccinellietalia maritimae), -Mediterranean salt meadows (Juncetalia maritimi), -European dry heaths, -Petrifying springs with tufa formation (Cratoneurion)*, -Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, -Spartina swards (Spartinion maritimae), -Mudflats and sandflats not covered by seawater at low tide, -Estuaries	*Petromyzon marinus* (sea lamprey), *Lampetra planeri* (brook lamprey), *Lampetra fluviatilis (*river lamprey), *Alosa alosa* (twaite shad, *Samo salar* (Atlantic salmon), *Alosa alosa* (allis shad), *Lutra lutra* (Otter), *Austopotamobius pallipes* (white-clawed crayfish), *Margaritifera margaritifera* (freshwater pearl mussel), *Margaritifera durrovensis* (freshwater pearl mussel) [MP3], *Vertigo moulinsiana* (whorl snail),

Map ID	Site Name	Co	Area (Ha)	Annex I	Annex II
					Trichomanes speciosum (Killarney fern)
102	The Loughans	KK	41	Turloughs*	
103	Spahill and Clomantagh Hill	KK	147	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites)*	
104	Cullahill Mountain	KK	55	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites)*	
105	Galmoy Fen	KK	25	Alkaline fens	
106	Knockacoller Bog	LS	130	-Degraded raised bogs still capable of natural regeneration, -Active raised bogs*, -Depressions on peat substrates of the Rhynchosporion	
107	Coolrain Bog	LS	146	-Active raised bogs*, -Degraded raised bogs still capable of natural regeneration, -Depressions on peat substrates of the Rhynchosporion	
108	Slieve Bloom Mountains	OY LS	4879	-Blanket bog (*active only)*, -Northern Atlantic wet heaths with Erica tetralix, -Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*	
109	Clonaslee Eskers and Derry Bog	LS	279	-Alkaline fens, -Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites)*	*Vertigo geyeri,* (whorl snail)
110	Mountmellick	LS	2		*Vertigo moulinsiana*
111	Ballyprior Grassland	LS	72	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites)*	
112	Thomastown Quarry	KK	4	Petrifying springs with tufa formation (Cratoneurion)*	
113	Tramore Dunes and Backstrand	WD	753	-Fixed coastal dunes with herbaceous vegetation (grey dunes)*, -Annual vegetation of drift lines, -Embryonic shifting dunes, -Shifting dunes along the shoreline with Ammophila arenaria (white dunes),	

Map ID	Site Name	Co	Area (Ha)	Annex I	Annex II
				-Mudflats and sandflats not covered by seawater at low tide, -Atlantic salt meadows (Glauco-Puccinellietalia maritimae), -Mediterranean salt meadows (Juncetalia maritimi), -Perennial vegetation of stony banks, -Salicornia and other annuals colonizing mud and sand, -Spartina swards (Spartinion maritimae)	
114	Bannow Bay	WX	1326	-Estuaries, -Mudflats and sandflats not covered by seawater at low tide, -Annual vegetation of drift lines, -Perennial vegetation of stony banks, -Salicornia and other annuals colonizing mud and sand, -Atlantic salt meadows (Glauco-Puccinellietalia maritimae), Mediterranean salt meadows (Juncetalia maritimi), -Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi), -Embryonic shifting dunes, -Shifting dunes along the shoreline with Ammophila arenaria (white dunes), -Fixed coastal dunes with herbaceous vegetation (grey dunes)*, -Spartina swards (Spartinion maritimae)	
115	Blackstairs Mountains	WX CW	5053	-European dry heaths, -Northern Atlantic wet heaths with Erica tetralix	
116	Slaney River Valley	WW CW WX	2012	-Estuaries, -Mudflats and sandflats not covered by seawater at low tide, -Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation, -Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*, -Old sessile oak woods with Ilex and Blechnum in British Isles	*Alosa fallax* (twaite shad), *Lampetra fluviatilis* (river lamprey), *Lampetra planeri* (brook lamprey), *Petromyzo marinus* (sea lamprey), *Alosa alosa* (allis

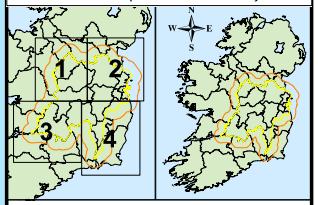
Map ID	Site Name	Co	Area (Ha)	Annex I	Annex II
					shad), Salmo salar (Atlantic salmon), *Lutra lutra* (otter), *Margaritife margaritife* (freshwater pearl mussel)
117	Holdenstown Bog		4	-Transition mires and quaking bogs, -Active raised bogs*, -Degraded raised bogs still capable of natural regeneration	
118	Vale of Clara (Rathdrum Wood)	WW	382	Old sessile oak woods with Ilex and Blechnum in British Isles	
119	The Murrough Wetlands	WW	606	-Atlantic salt meadows (Glauco-Puccinellietalia maritimae), -Annual vegetation of drift lines, -Perennial vegetation of stony banks, -Alkaline fens, -Mediterranean salt meadows (Juncetalia maritimi), -Calcareous fens with Cladium mariscus and species of the Caricion davallianae*	
120	Carriggower Bog	WW	93	Transition mires and quaking bogs	
121	Glen of the Downs	WW	74	Old sessile oak woods with Ilex and Blechnum in British Isles	
122	Scragh Bog	WH	24	-Alkaline fens, -Transition mires and quaking bogs	*Euphydryas aurinia,* *Drepanocladus vernicosus*
123	Lisbigney Bog	LS	36	-Calcareous fens with Cladium mariscus and species of the Caricion davallianae*	*Vertigo moulinsiana* (whorl snail)



Legend

- Study Area
- 15km Buffer
- SACs

Data Source:
SAC data downloaded from National Parks and Wildlife Services website (www.npws.ie). The data on the website was last updated on the 28th May 2008



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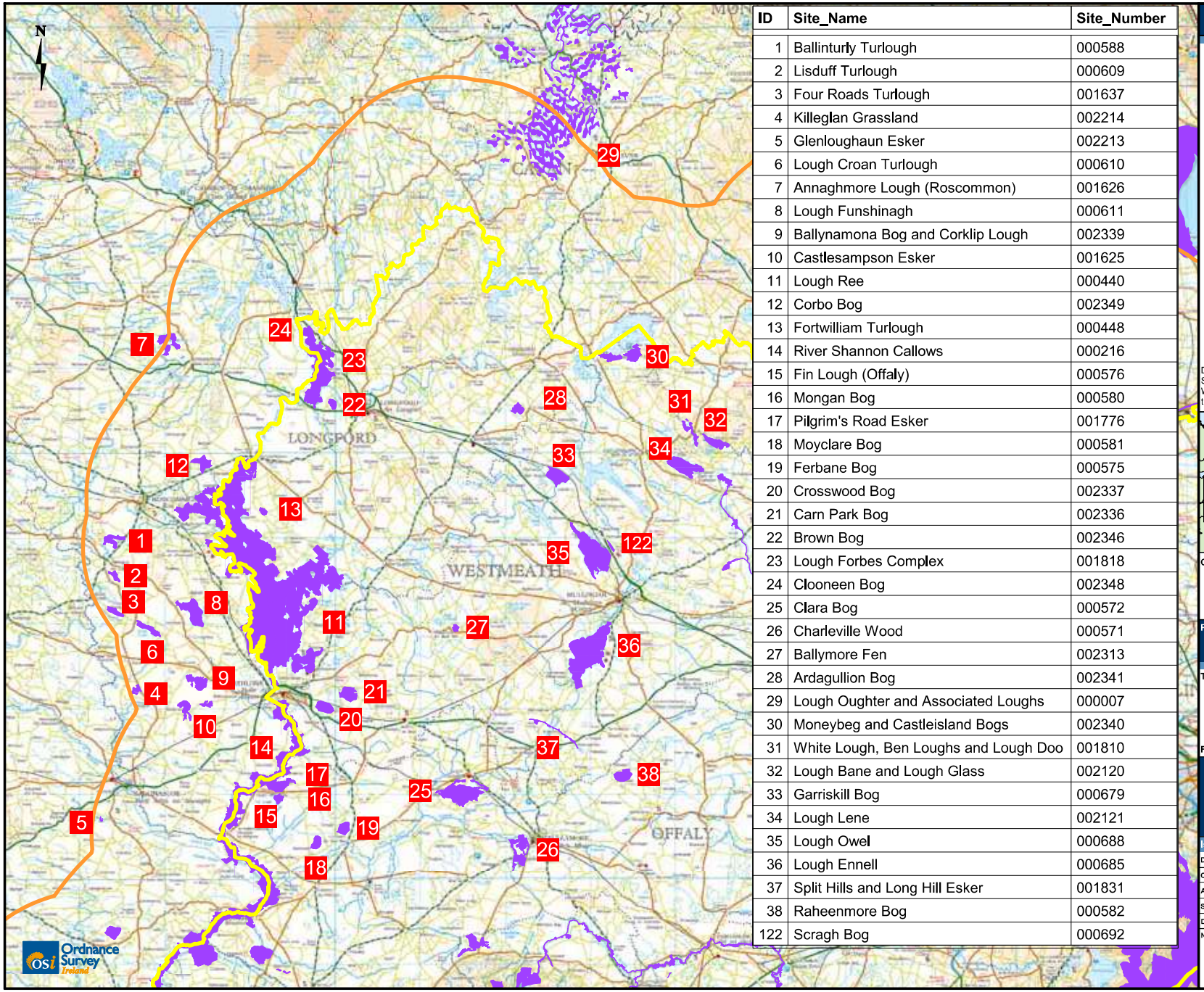
Title
SAC (Overview Map)

Figure 3.3

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Approved by:	E. Oliviera		
Scale:	1:1,200,000 @ A4	Drawing No.	Rev.
Date:	03/10/08	Mi0014	F01

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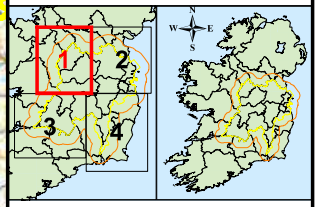


ID	Site_Name	Site_Number
1	Ballinturly Turlough	000588
2	Lisduff Turlough	000609
3	Four Roads Turlough	001637
4	Killeglan Grassland	002214
5	Glenloughaun Esker	002213
6	Lough Croan Turlough	000610
7	Annaghmore Lough (Roscommon)	001626
8	Lough Funshinagh	000611
9	Ballynamona Bog and Corklip Lough	002339
10	Castlesampson Esker	001625
11	Lough Ree	000440
12	Corbo Bog	002349
13	Fortwilliam Turlough	000448
14	River Shannon Callows	000216
15	Fin Lough (Offaly)	000576
16	Mongan Bog	000580
17	Pilgrim's Road Esker	001776
18	Moyclare Bog	000581
19	Ferbane Bog	000575
20	Crosswood Bog	002337
21	Carn Park Bog	002336
22	Brown Bog	002346
23	Lough Forbes Complex	001818
24	Clooneen Bog	002348
25	Clara Bog	000572
26	Charleville Wood	000571
27	Ballymore Fen	002313
28	Ardagullion Bog	002341
29	Lough Oughter and Associated Loughs	000007
30	Moneybeg and Castleisland Bogs	002340
31	White Lough, Ben Loughs and Lough Doo	001810
32	Lough Bane and Lough Glass	002120
33	Garriskill Bog	000679
34	Lough Lene	002121
35	Lough Owel	000688
36	Lough Ennell	000685
37	Split Hills and Long Hill Esker	001831
38	Raheenmore Bog	000582
122	Scragh Bog	000692

Legend

- Study Area
- 15km Buffer
- SACs

Data Source:
SAC data downloaded from National Parks and Wildlife Services website (www.npws.ie). The data on the website was last updated on the 28th May 2008.



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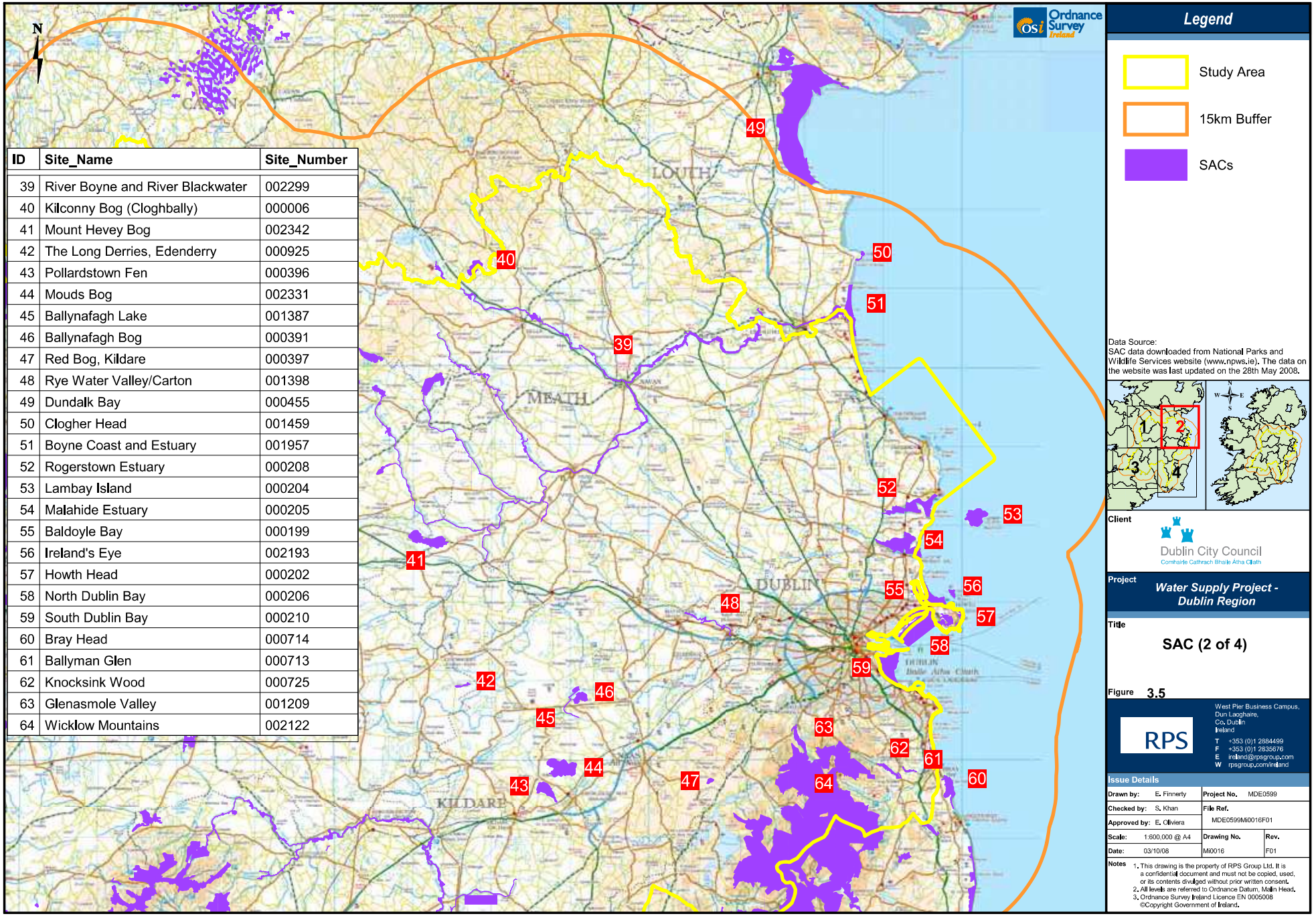
Figure 3.4

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ID	Site_Name	Site_Number
39	River Boyne and River Blackwater	002299
40	Kilconny Bog (Cloghbally)	000006
41	Mount Hevey Bog	002342
42	The Long Derries, Edenderry	000925
43	Pollardstown Fen	000396
44	Mouds Bog	002331
45	Ballynafagh Lake	001387
46	Ballynafagh Bog	000391
47	Red Bog, Kildare	000397
48	Rye Water Valley/Carton	001398
49	Dundalk Bay	000455
50	Clogher Head	001459
51	Boyne Coast and Estuary	001957
52	Rogerstown Estuary	000208
53	Lambay Island	000204
54	Malahide Estuary	000205
55	Baldoyle Bay	000199
56	Ireland's Eye	002193
57	Howth Head	000202
58	North Dublin Bay	000206
59	South Dublin Bay	000210
60	Bray Head	000714
61	Ballyman Glen	000713
62	Knocksink Wood	000725
63	Glenasmole Valley	001209
64	Wicklow Mountains	002122

Legend

- Study Area
- 15km Buffer
- SACs

Data Source:
SAC data downloaded from National Parks and Wildlife Services website (www.npws.ie). The data on the website was last updated on the 28th May 2008.

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Project: *Water Supply Project - Dublin Region*

Title: **SAC (2 of 4)**

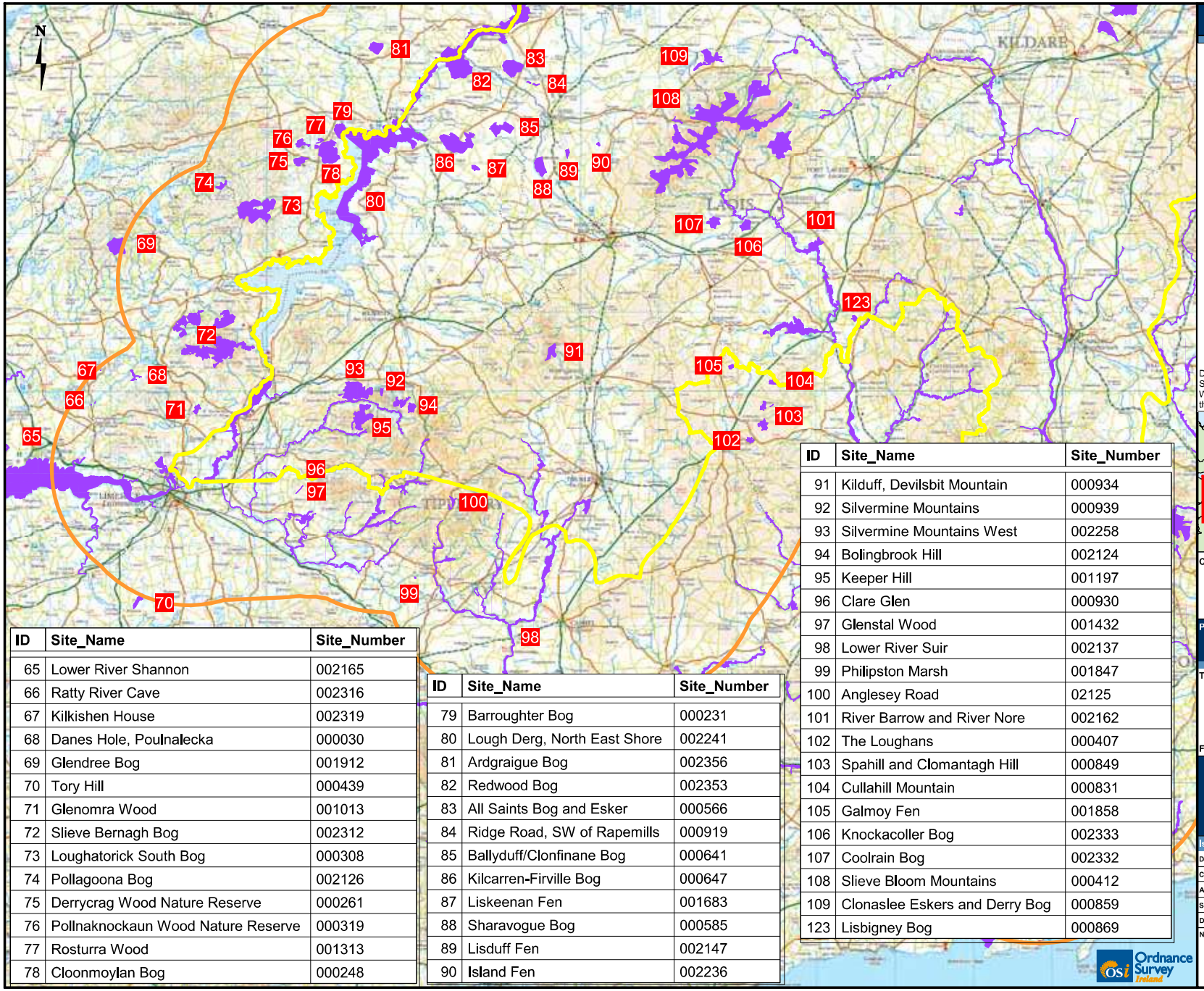
Figure: **3.5**

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ID	Site_Name	Site_Number
65	Lower River Shannon	002165
66	Ratty River Cave	002316
67	Kilkishen House	002319
68	Danes Hole, Poulnalecka	000030
69	Glendree Bog	001912
70	Tory Hill	000439
71	Glenomra Wood	001013
72	Slieve Bernagh Bog	002312
73	Loughatorick South Bog	000308
74	Pollagoona Bog	002126
75	Derrycrag Wood Nature Reserve	000261
76	Pollnaknockaun Wood Nature Reserve	000319
77	Rosturra Wood	001313
78	Cloonmoylan Bog	000248

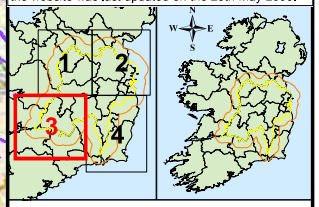
ID	Site_Name	Site_Number
79	Barroughter Bog	000231
80	Lough Derg, North East Shore	002241
81	Ardgraigue Bog	002356
82	Redwood Bog	002353
83	All Saints Bog and Esker	000566
84	Ridge Road, SW of Rapemills	000919
85	Ballyduff/Clonfinane Bog	000641
86	Kilcarren-Firville Bog	000647
87	Liskeenan Fen	001683
88	Sharavogue Bog	000585
89	Lisduff Fen	002147
90	Island Fen	002236

ID	Site_Name	Site_Number
91	Kilduff, Devilsbit Mountain	000934
92	Silvermine Mountains	000939
93	Silvermine Mountains West	002258
94	Bolingbrook Hill	002124
95	Keeper Hill	001197
96	Clare Glen	000930
97	Glenstal Wood	001432
98	Lower River Suir	002137
99	Philipston Marsh	001847
100	Anglesey Road	02125
101	River Barrow and River Nore	002162
102	The Loughans	000407
103	Spahill and Clomantagh Hill	000849
104	Cullahill Mountain	000831
105	Galmoy Fen	001858
106	Knockacoller Bog	002333
107	Coolrain Bog	002332
108	Slieve Bloom Mountains	000412
109	Clonaslee Eskers and Derry Bog	000859
123	Lisbigney Bog	000869

Legend

- Study Area
- 15km Buffer
- SACs

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Title: **SAC (3 of 4)**

Figure: **3.6**

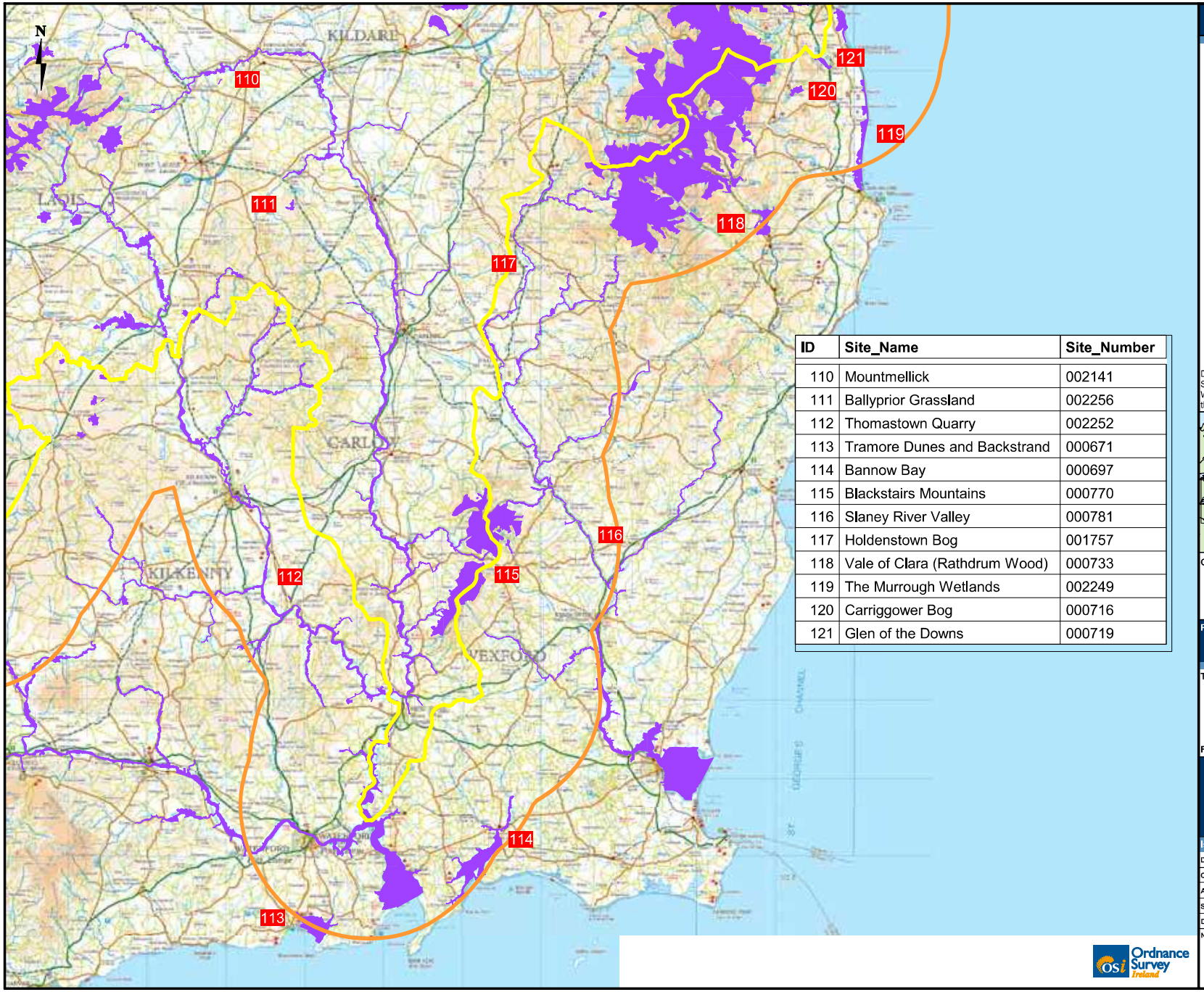
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ID	Site_Name	Site_Number
110	Mountmellick	002141
111	Ballyprior Grassland	002256
112	Thomastown Quarry	002252
113	Tramore Dunes and Backstrand	000671
114	Bannow Bay	000697
115	Blackstairs Mountains	000770
116	Slaney River Valley	000781
117	Holdenstown Bog	001757
118	Vale of Clara (Rathdrum Wood)	000733
119	The Murrough Wetlands	002249
120	Carriggower Bog	000716
121	Glen of the Downs	000719

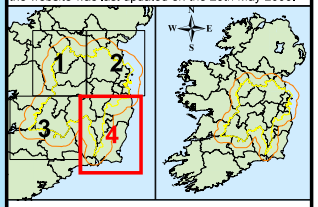
Legend

Study Area

15km Buffer

SACs

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Figure: 3.7

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3.5.2 Special Protection Areas (SPA)

Table 3.6 provides a list of the SPA sites along with details relating to their size and the Annex I and other species contained within them. **Table 3.4** shows the county abbreviations used in **Table 3.6** **Figures 3.8-3.12** illustrate the 42 SPAs listed.

Table 3.6 Special Protection Area Sites within HDA Study Area*

Site ID	Site Name	Co	Area (ha)	Annex I Species	Other Species
1	River Suck Callows	G RN	3236	Greenland White Fronted Goose, Whooper Swan, Golden Plover	Wigeon, Lapwing, Mute Swan, Teal, Pintail, Curlew, Black Headed Gull
2	Middle Shannon Callows	G OY RN TY WH	5819	Whooper Swan, Corncrake, Golden Plover, Bewick's Swan, Greenland White Fronted Goose, Merlin, Hen Harrier, Kingfisher	20,000+ Wintering Waterfowl, Mute Swan, Wigeon, Lapwing, Black Tailed Godwit, Whimbrel, Teal, Tufted Duck, Dunlin, Curlew, Redshank, Black Headed Gull, Snipe, Shoveler, Quail, Sedge Warbler, Grasshopper Warbler, Skylark, Reed Bunting, Whinchat
3	Lough Ree	LD WH RN	10720	Whooper Swan, Greenland White Fronted Goose, Common Tern, Golden Plover	Wigeon, Teal, Pintail, Tufted Duck, Goldeneye, Lapwing, Cormorant, Mallard, Coot, Shoveler, Curlew, Great Crested Grebe, , Little Grebe, Mute Swan, Black Headed Gull, Lesser Black-backed Gull, Common Gull, Common Scoter, Garden Warbler
4	Mongan Bog	OY	129	Greenland White Fronted Goose	Mallard, Snipe, Curlew, Skylark, Meadow Pipit
5	Ballykenny-Fishertown Bog	RN LD	1351	Whooper Swan, Merlin	Cormorant, Wigeon, Teal, Shoveler, Tufted Duck, Goldeneye, Red Grouse
6	Glen Lough	LD WH	82	Whooper Swan, Greenland White Fronted Goose	Wigeon, Teal, Mallard, Pintail, Shoveler, Lapwing
7	Lough Oughter	CN	1460	Whooper Swan, Greenland White Fronted Goose, Common Tern	Great Crested Grebe, Mute Swan, Wigeon, Goldeneye, Teal, Mallard, Pochard, Tufted Duck, Lapwing, Curlew, Little Grebe, Cormorant, Black Headed Gull
8	Lough Iron	WH	936	Greenland White Fronted Goose, Whooper Swan, Golden Plover	Mute Swan, Wigeon, Mallard, Pintail, Teal, Shoveler, Pochard, Tufted Duck, Coot, Lapwing, Snipe, Curlew
9	Garriskill Bog	WH	323	Greenland White Fronted Goose, Merlin	Snipe, Curlew, Redshank, Barn Owl, Red Grouse
10	Lough Kinale and Derragh Lough	CN WH LD	287	Golden Plover	Pochard, Tufted Duck, Mute Swan, Coot, Great Crested Grebe, Mallard, Goldeneye, Lapwing

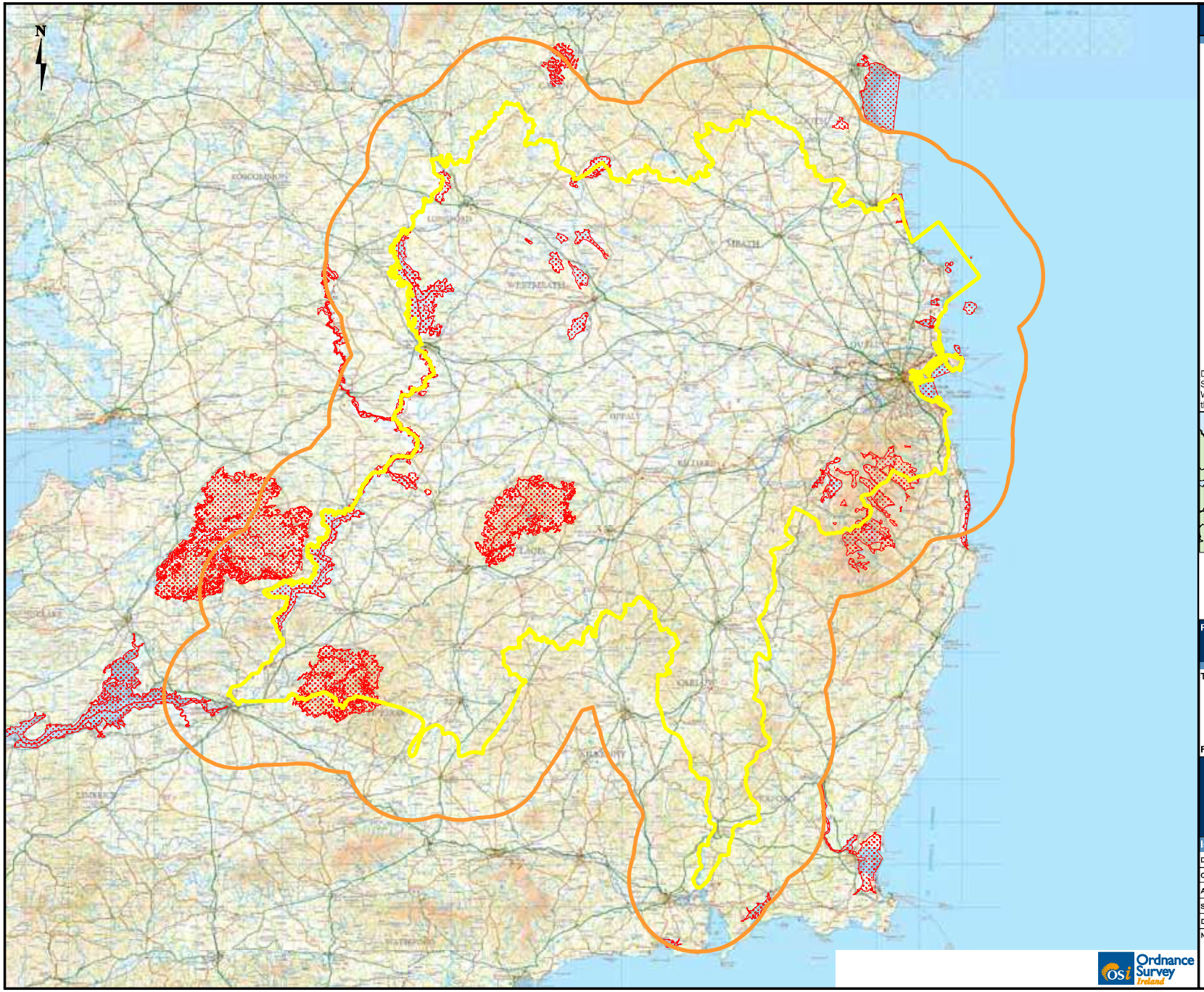
Site ID	Site Name	Co	Area (ha)	Annex I Species	Other Species
11	Lough Ennell	WH	1398	Greenland White Fronted Goose, Golden Plover	Mute Swan, Tufted Duck, Pochard, Coot, Lapwing, Little Grebe, Mallard, Great Crested Grebe, Goldeneye,
12	Lough Owel	WH	1115	Greenland White Fronted Goose	Shoveler, Coot, Pochard, Tufted Duck, Goldeneye, Little Grebe, Great Crested Grebe, Cormorant
13	Lough Derravaragh	WH	1116	Greenland White Fronted Goose, Whooper Swan, Golden Plover	Little Grebe, Mute Swan, Pochard, Tufted Duck, Coot, Great Crested Grebe, Cormorant, Wigeon, Teal, Mallard, Pintail, Shoveler, Goldeneye, Lapwing
14	Lough Sheelin	WH MH CN	1881		Great Crested Grebe, Pochard, Tufted Duck, Goldeneye, Mute Swan, Mallard, Coot, Little Grebe, Cormorant, Black Headed Gull
15	Stabannan-Braganstown	LH	489	Greenland White Fronted Goose, Whooper Swan, Golden Plover, Bewick's Swan	Greylag Goose, Lapwing
16	Dundalk Bay	LH	10880	Bar Tailed Godwit, Golden Plover, Red Throated Diver, Great Northern Diver, Ruff	20,000+ Wintering Waterfowl, Brent Goose, Black Tailed Godwit, Great Crested Grebe, Greylag Goose, Shelduck, Mallard, Pintail, Red Breasted Merganser, Ringed Plover, Grey Plover, Lapwing, Knot, Dunlin, Curlew,, Redshank, Cormorant, Grey Heron, Mute Swan, Wigeon, Teal, Goldeneye, Greenshank, Turnstone, Black Headed Gull, Common Gull, Herring Gull, Great Black-backed Gull, Little Stint, Curlew, Sandpiper
17	Boyne Estuary	LH MH	434	Golden Plover, Bar Tailed Godwit,	Shelduck, Oystercatcher, Grey Plover, Lapwing, Knot, Sanderling, Black Tailed Godwit, Redshank, Turnstone, Cormorant, Brent Goose, Wigeon, Teal, Dunlin, Curlew, Mallard, Red Breaster Merganser, Greenshank, Ringed Plover, Mute Swan, Black Headed Gull, Common Gull, Herring Gull, Great Black-backed Gull
18	River Nanny Estuary and Shore	MH	272	No Site Synopsis	
19	Rockabill	D	1140	Roseate Tern, Common Tern, Arctic Tern	Black Guillemot, Kittiwake
20	Skerries Islands	D	216	Golden Plover, Short Eared Owl	Brent Goose, Cormorant, Shag, Herring Gull, Great Black-backed

Site ID	Site Name	Co	Area (ha)	Annex I Species	Other Species
					Gull, Turnstone, Purple Sandpiper, Fulmar, Lesser Black-backed Gull, Shelduck, Ringed Plover, Oystercatcher, Wigeon, Mallard, Grey Plover, Lapwing, Dunlin, Snipe, Curlew
21	Rogerstown Estuary	D	640	Golden Plover, Ruff	Pale Bellied Brent Goose, Greylag Goose, Shelduck, Shoveler, Oystercatcher, Ring Plover, Grey Plover, Knot, Sanderling, Dunlin, Redshank, Lapwing, Black Tailed Godwit, Greenshank, Turnstone, Wigeon, Teal, Mallard, Red Breasted Merganser, Curlew, Herring Gull, Black Backed Gull, Black Headed Gull, Green Sandpiper, Little Stint, Curlew Sandpiper, Spotted Redshank
22	Lambay Island	D	610	Peregrine Falcon	Cormorant, Shag, Razorbill, Guillemot, Fulmar, Lesser Black-backed Gull, Herring Gull, Great Black-backed Gull, Kittiwake, Greylag Goose, Puffin, Manx Shearwaters, Black Guillemot, Oystercatcher, Ringed Plover, Shelduck, Raven, Stonechat, Whitethroat, Reed Bunting, Brent Goose, Purple Sandpiper, Curlew, Turnstone
23	Broadmeadow/Swords Estuary	D	721	Golden Plover, Bar Tailed Godwit, Ruff	Brent Goose, Shelduck, Pintail, Goldeneye, Red Breasted Merganser, Oystercatcher, Grey plover, Knot, Dunlin, Black Tailed Godwit, Redshank, Greenshank, Great Crested Grebe, Mute Swan, Pochard, Ring Plover, Lapwing, Curlew, Turnstone, Goldeneye, Curlew Sandpiper, Spotted Redshank, Green Sandpiper, Little Stint, Mallard, Grey Heron
24	Baldoyle Bay	D	207	Golden Plover, Bar Tailed Godwit	Pale Bellied Brent Goose, Great Crested Grebe, Shelduck, Pintail, Ringed plover, Grey Plover, Teal, Mallard, Common Scoter, Oystercatcher, Lapwing, Knot Dunlin, Black Tailed Godwit, Curlew, Redshank, Greenshank, Turnstone, Curlew Sandpiper, Spotted Redshank, Green Sandpiper
25	Irelands Eye	D	177	Peregrine Falcon	Gannet, Cormorant, Herring Gull, Great Black-backed Gull, Kittiwake, Guillemot, Razorbill, Shag, Lesser Black-backed Gull, Puffin, Black

Site ID	Site Name	Co	Area (ha)	Annex I Species	Other Species
					Guillemot, Shelduck, Oystercatcher, Ringed Plover, Greylag Goose, Pale Bellied Brent Goose
26	Howth Head Coast	D	201	Peregrine Falcon	Kittiwake, Razorbill, Black Guillemot, Fulmar, Shag, Herring Gull, Great Black-backed Gull, Guillemot
27	North Bull Island	D	1936	Bar Tailed Godwit, Golden Plover, Ruff. Short Eared Owl	20,000+ Wintering Waterfowl, Brent Goose, Shelduck, Teal, Pintail, Shoveler, Oystercatcher, Ringed Plover, Grey Plover, Knot, Sanderling, Dunlin, Black Tailed Godwit, Curlew, Redshank, Turnstone, Grey Heron, Cormorant, Wigeon, Goldeneye, Red Breasted Merganser, Greenshank, Black Headed Gull, Common Gull, Curlew Sandpiper, Spotted Redshank, Skylark, Meadow Pipit, Stonechat, Reed Bunting
28	Sandymount Strand/Tolka Estuary	D	1693	Bar Tailed Godwit, Mediterranean Gull, Common Tern, Arctic Tern, Roseate Tern	Brent Goose, Oystercatcher, Ringed Plover, Knot, Sanderling, Dunlin, Great Crested Grebe, Grey Plover, Curlew, Redshank, Turnstone, Black Headed Gull, Common Gull, Herring Gull
29	River Shannon and River Fergus Estuaries	LK CE KY	33497	Whooper Swan, Golden Plover, Bat Tailed Godwit	Dunlin, Black Tailed Godwit, Redshank, Cormorant, Greylag Goose, Shelduck, Wigeon, Teal, Pintail, Shoveler, Scaup, Grey Plover, lapwing, Knot, Curlew, Greenshank, Oystercatcher, Ringed plover, Brent Goose, Great Crested Grebe, Red Breasted Merganser, Mallard, Turnstone, Mute Swan, Grey Heron, Black Headed Gull, Common Gull, Whimbrel
30	Slieve Aughty Mountains	G CE	60600	No Site Synopsis	
31	Lough Derg (Shannon)	GY CE TY	11839	Common Terns, Whooper Swan, Greenland White Fronted Goose	Tufted Duck, Goldeneye, Mute Swan, Black Headed Gull, Cormorant, Great Crested Grebe, Wigeon, Teal, Mallard, Pochard, Coot, Lapwing, Little Grebe
32	Slievefelim to Silvermines Mountains	LK TY	20560	No Site Synopsis	
33	River Little Brosna Callows	OY TY	1147	Greenland White Fronted Goose, Whooper Swan, Golden Plover	20,000+ Wintering Waterfowl, Black Tailed Godwit, Wigeon, Teal, Pintail, Shoveler, Lapwing, Mute Swan, mallard, Dunlin, Pochard, Curlew, Black Headed Gull,

Site ID	Site Name	Co	Area (ha)	Annex I Species	Other Species
					Redshank, Snipe
34	All Saints Bog	OY	309	Merlin	
35	Dovegrove Callows	OY	131	Greenland White Fronted Goose	
36	Slieve Bloom Mountains	OY LS	21253	No Site Synopsis	
37	Poulaphouca Reservoir	WW KE	2001	Whooper Swan	Greylag Goose, Wigeon, Teal, Mallard, Goldeneye, Cormorant, Great Crested Grebe, Curlew, Mute Swan, Grey Heron, Lesser Black-backed Gull, Black Headed Gull, Common Gull, Snipe, Lapwing
38	Wicklow Mountains	WW	29460	Merlin, Peregrine Falcon	Ring Ouzel, Red Grouse, Goosander, Whinchat, Redstart, Wood Warbler, Garden Warbler, Blackcap
39	The Murrough	WW	926	No Site Synopsis	
40	Wexford Harbour and Slobs	WX	6107	No Site Synopsis	
41	Bannow Bay	WX	976	Golgden Plover, Bar Tailed Godwit	Brent Goose, Shelduck, Pintail, Oystercatcher, Grey Plover, Lapwing, Knot, Dublin, Black Tailed Godwit, Curlew, Redshank, Wigeon, Teal, Ringed Plover, Turnstone
42	Tramore Back Strand	WD	458	Golden Plover, Bar Tailed Godwit, Little Egret	Grey Plover, Lapwing, Dunlin, Sanderling, Black Tailed Godwit, Wigeon, Teal, Red Breasted Merganser, Oystercatcher, Ringed plover, Knot, Snipe, Curlew, Redshank, Greenshank, Turnstone

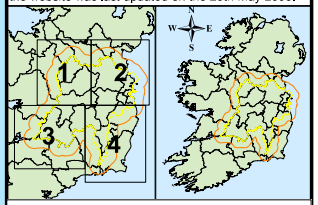
***(This list was compiled from available site synopses and does not constitute a list of qualifying features for the sites).**



Legend

- Study Area
- 15km Buffer
- SPAs

Data Source:
SPA data downloaded from National Parks and Wildlife Services website (www.npws.ie). The data on the website was last updated on the 28th May 2008.



Dublin City Council
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Project *Water Supply Project - Dublin Region*

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SPA (Overview Map)

Figure 3.8

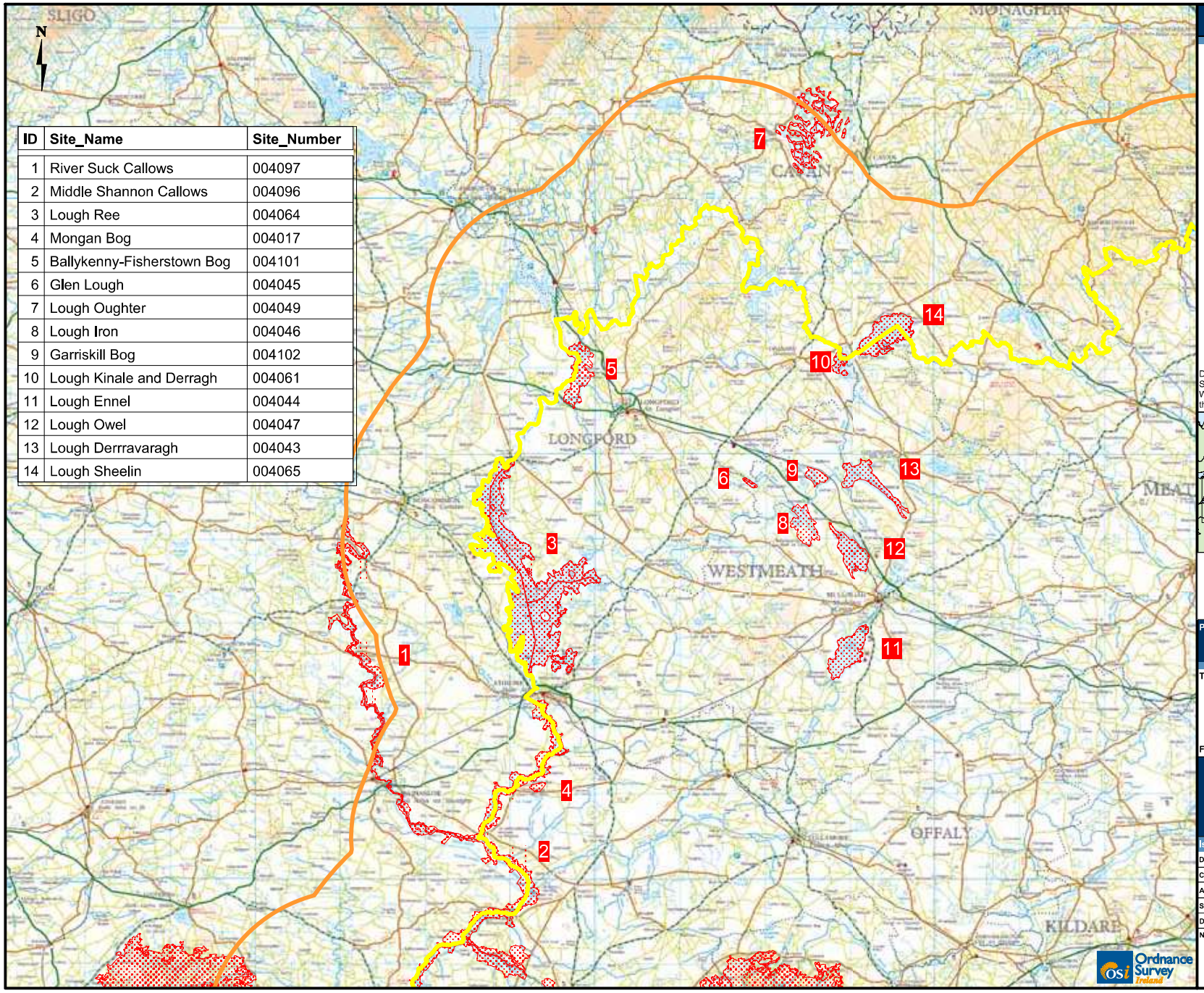
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Approved by:	E. Oliviera		
Scale:	1:1,200,000 @ A4	Drawing No.	Rev.
Date:	3/10/08	Mi0019	F01

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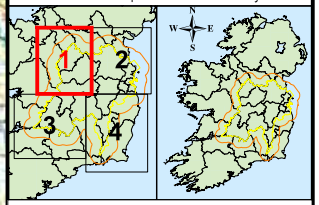


ID	Site_Name	Site_Number
1	River Suck Callows	004097
2	Middle Shannon Callows	004096
3	Lough Ree	004064
4	Mongan Bog	004017
5	Ballykenny-Fisherstown Bog	004101
6	Glen Lough	004045
7	Lough Oughter	004049
8	Lough Iron	004046
9	Garriskill Bog	004102
10	Lough Kinale and Derragh	004061
11	Lough Ennel	004044
12	Lough Owel	004047
13	Lough Derrravaragh	004043
14	Lough Sheelin	004065

Legend

- Study Area
- 15km Buffer
- SPAs

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SPA data downloaded from National Parks and Wildlife Services website (www.npws.ie). The data on the website was last updated on the 28th May 2008.



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SPA (1 of 4)

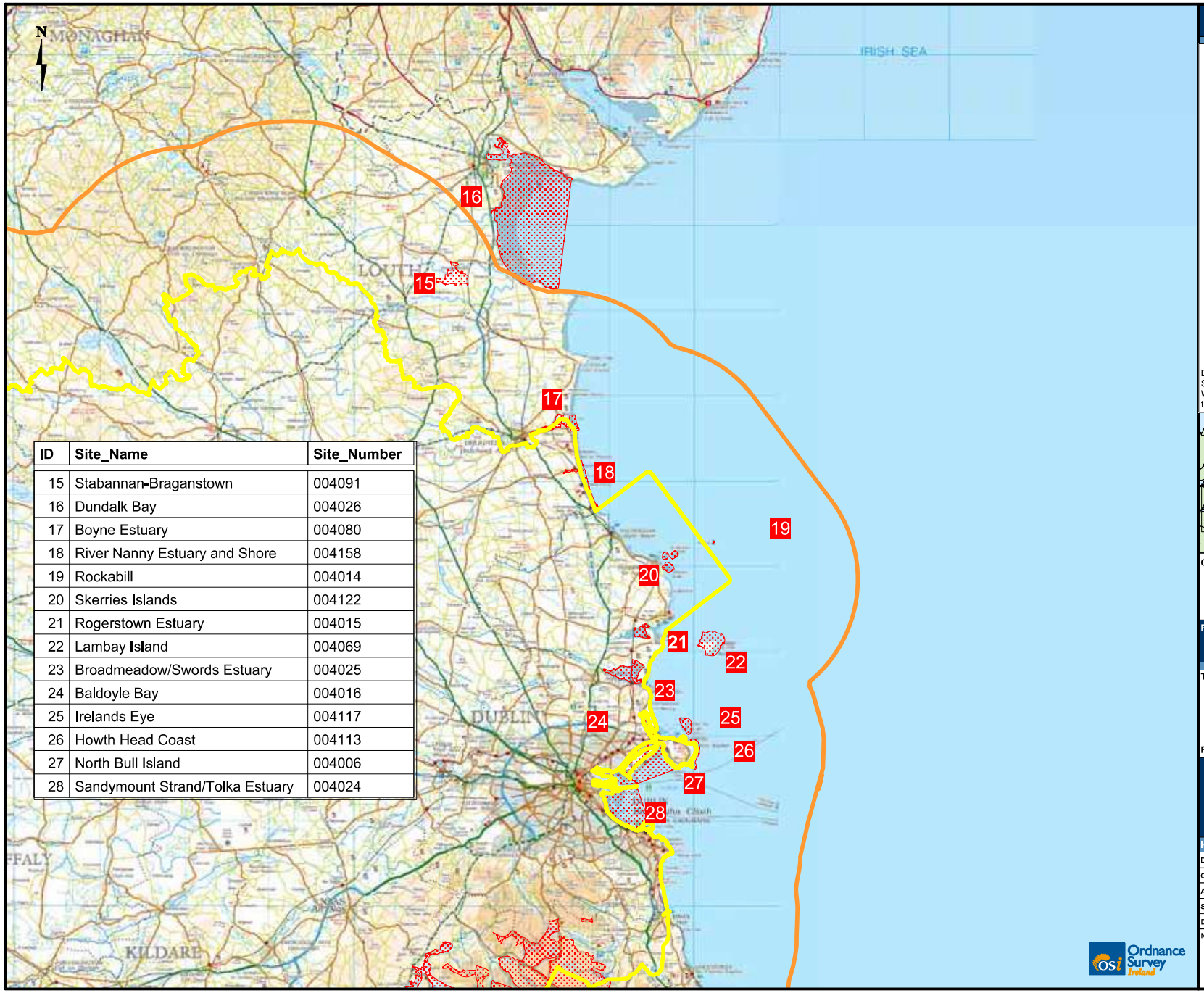
Figure 3.9

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ID	Site_Name	Site_Number
15	Stabannan-Braganstown	004091
16	Dundalk Bay	004026
17	Boyne Estuary	004080
18	River Nanny Estuary and Shore	004158
19	Rockabill	004014
20	Skerries Islands	004122
21	Rogerstown Estuary	004015
22	Lambay Island	004069
23	Broadmeadow/Swords Estuary	004025
24	Baldoyle Bay	004016
25	Irelands Eye	004117
26	Howth Head Coast	004113
27	North Bull Island	004006
28	Sandymount Strand/Tolka Estuary	004024

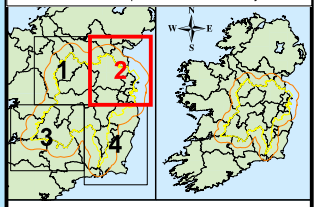
Legend

Study Area

15km Buffer

SPAs

Data Source:
SPA data downloaded from National Parks and Wildlife Services website (www.npws.ie). The data on the website was last updated on the 28th May 2008



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Project
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Title
SPA (2 of 4)

Figure **3.10**

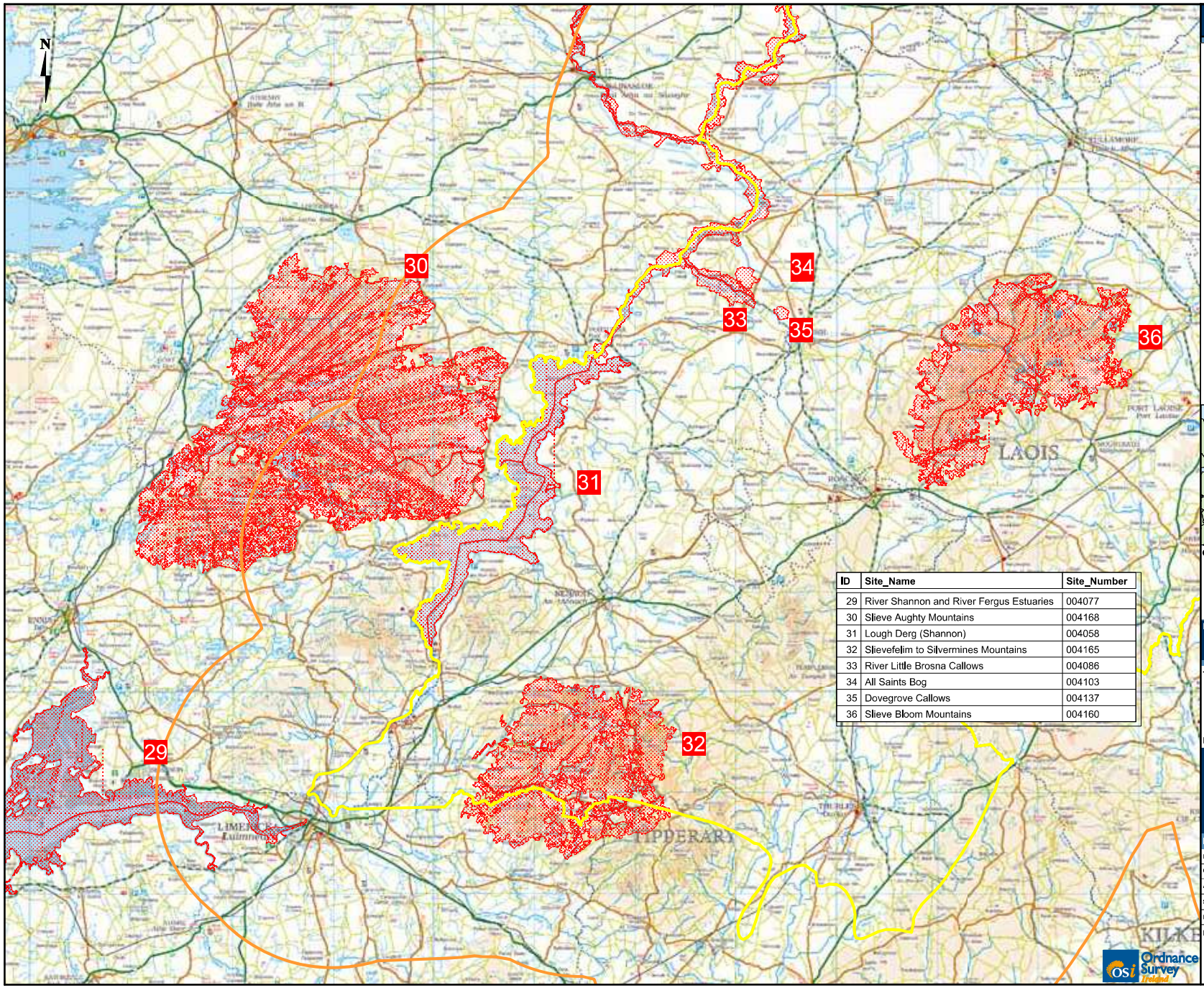
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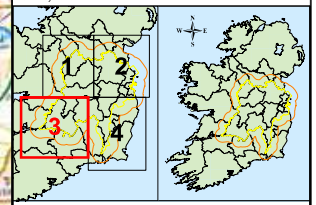


ID	Site_Name	Site_Number
29	River Shannon and River Fergus Estuaries	004077
30	Slieve Aughty Mountains	004168
31	Lough Derg (Shannon)	004058
32	Slievefelim to Silvermines Mountains	004165
33	River Little Brosna Callows	004086
34	All Saints Bog	004103
35	Dovegrove Callows	004137
36	Slieve Bloom Mountains	004160

Legend

- Study Area
- 15km Buffer
- SPAs

Data Source:
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Project **Water Supply Project - Dublin Region**

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SPA (3 of 4)

Figure **3.11**

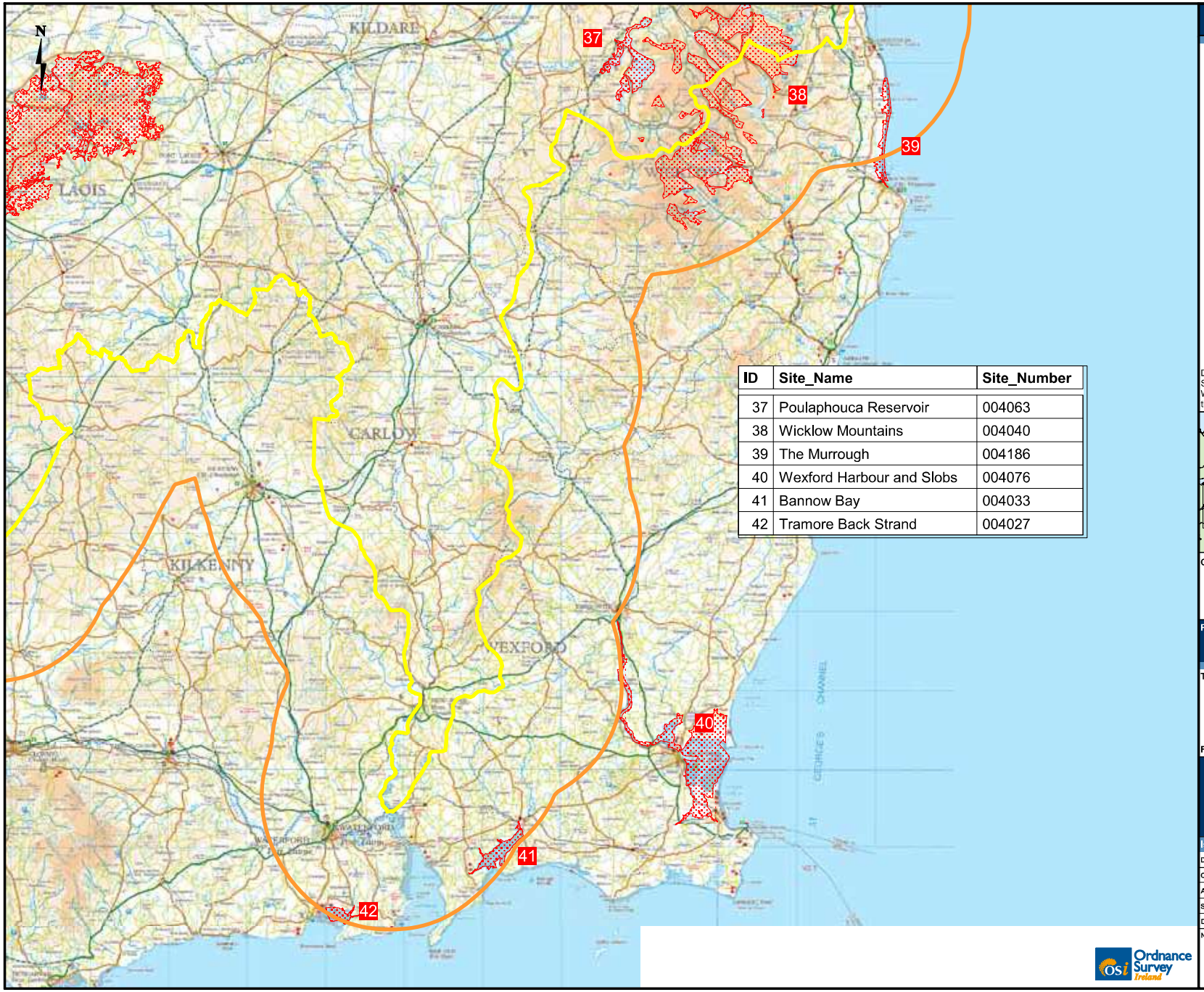
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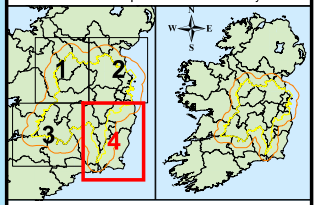


ID	Site_Name	Site_Number
37	Poulaphouca Reservoir	004063
38	Wicklow Mountains	004040
39	The Murrough	004186
40	Wexford Harbour and Slobs	004076
41	Bannow Bay	004033
42	Tramore Back Strand	004027

Legend

- Study Area
- 15km Buffer
- SPAs

Data Source:
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Figure **3.12**

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3.6 ECOLOGICAL BASELINE

3.6.1 Option A – Lough Ree

3.6.1.1 General Description of Study Area

The study area is located along the south eastern shore of Lough Ree on the River Shannon. **Figure 4.3** in the Strategic Environmental Assessment Environmental Report (Phase II) provides a study area for Lough Ree. The Lough itself generally has a rock/cobble littoral zone, with a mud substratum in deeper water. Reedbeds dominate the shallow water in many of the sheltered parts of the Lough and are common in sheltered bays. The south eastern shore of Lough Ree is indented with sheltered bays and lakes which are collectively known as the *Inner Lakes* (including Ross Lough; north of the study area). The lakeshore is characterised by wetland habitats including wet grassland, marsh and swamp and is prone to winter flooding. There are also pockets of wet woodland along the lake edge. Moving inland from the lake, the landscape is a mosaic of grassland, scrub and some pockets of mixed woodland. This area is not intensively managed and where grazing has been suspended a rich diversity of flora has developed including orchid rich grassland.

3.6.1.2 Designated Areas

The proposed abstraction area is within Lough Ree Special Area of Conservation (SAC 000440) and Special Protection Area (for birds) (SPA 004064). The boundary of the SPA follows the lake shoreline while the boundary of the SAC extends further inland to the access road between Portlick and Killeenmoore.

Lough Ree is a designated SAC due to the occurrence of the following Annex I and priority* habitats (as listed in EU Habitats Directive 92/43/EEC); natural eutrophic lakes, old oak woodlands, orchid rich calcareous grassland*, limestone pavement*, bog woodland* and degraded raised bog-capable of regeneration and for the Annex II listed species: otter.

Lough Ree is a designated SPA as it is of high ornithological importance for both wintering and breeding birds. It is one the most important midland sites for wintering waterfowl with nationally important numbers of 11 species including: little grebe, whooper swan (Annex 1 of EU Birds Directive 79/409/EEC), wigeon, teal, pintail, tufted duck, goldeneye, golden plover, and lapwing (Crowe, 2005). It is a regionally important area for a number of other species including Greenland white-fronted goose (Annex 1 species). Breeding birds include nationally important populations of common scoter, great crested grebe and tufted duck. It also has a breeding colony of common tern (Annex 1 species).

3.6.1.3 Rare and Protected Species of Flora and Fauna

In addition to otter, the NPWS data base of rare and protected species lists two vascular plant species from the 10km eastern area of Lough Ree: betony (*Stachys officinalis*) and historical records of round prickly-headed poppy (*Papaver hybridum*). Both of these species are listed in the Irish Red Data Book (Curtis and McGough, 1988) and protected under the Flora Protection Order (1999). In addition the water germander (*Teucrium scordium*), not listed in the Flora Protection Order, is a rare plant found along the shores of Lough Ree and narrow-leaved Helleborine (*Cephalanthera longifolia*) is found and listed under the Flora Protections Order. Other rare species include the stonewort (*Chara tomentosa*), which is present in shallow water around the lake and marsh pea (*Lathyrus palustris*) occurs on some of the callowland.

3.6.1.4 Fauna

Birds

The many bays and inlets of Lough Ree support a relatively high diversity and abundance of wetland birds. The site is covered by IWeBs (Irish Wetland Birds Survey) and records show it contains nationally important populations of wigeon, teal, pintail, tufted duck, goldeneye, golden plover and lapwing. Regionally important numbers of whooper swan and Greenland white-fronted goose are found feeding in the vicinity of the lake, as are golden plover, lapwing and, to some extent, wigeon and teal. Other species, which occur in winter, include cormorant, mallard, coot, shoveler, curlew and great crested grebe, as well as the resident little grebe and mute swan. The site is a traditional breeding site for black-headed gull. Lesser black-backed gull and common gull have bred in the past and may still breed. Lough Ree is an important site for breeding duck and grebes, with tufted duck and great crested grebe having populations of national importance. Of particular note is that Lough Ree is one of the two main sites in the country for breeding common scoter. The woodland around the lake is a stronghold for garden warbler and this scarce species probably occurs on some of the islands within the site (Crowe, 2005).

Mammals

Otter, a species listed on Annex II of the E.U. Habitats Directive occurs frequently within the site.

3.6.2 Option B – Lough Derg

3.6.2.1 General Description of Study Area

A potential abstraction site has been identified along the north western shores of Lough Derg (West of Portumna). **Figure 4.5** in the Strategic Environmental Assessment Environmental Report (Phase II) provides a study area for Lough Derg. The Lough itself generally has a rock/cobble littoral zone, with a mud substratum in deeper water. Reedbeds dominate the shallow water in many of the sheltered parts

of the Lough and are common in sheltered bays. The lake edge at this location is indented with dense stands of rushes grading to wet grassland, marsh and swamp and is prone to winter flooding. There are also pockets of wet woodland along the lake edge. Moving inland from the lake, the landscape is a mosaic of grassland, hedgerows, residential housing with some pockets of mixed woodland. Farmland is not intensively managed close to the lake shore; however, fields inland are more intensively managed.

3.6.2.2 Designated Areas

The proposed abstraction point associated pipeline is within Lough Derg, North East Shore Special Area of Conservation (SAC 002241) and Lough Derg (Shannon) Special Protection Area (for birds) (SPA 004058). The boundary of the SPA follows the lake shoreline while the boundary of the SAC extends further inland to the west of the proposed pump house site to the N65 at Carrigahorig.

Lough Derg is a designated SAC due to the occurrence of six habitats listed on Annex I of the EU Habitats Directive including four priority* habitats (as listed in EU Habitats Directive 92/43/EEC): *Cladium* fen*, alluvial woodland*, limestone pavement*, yew woodland*, alkaline fen and juniper scrub formations on heath and calcareous grasslands. It is the only known site for the protected and rare plant Irish fleabane *(Inula salicina*) that occurs in a few sites along the lakeshore. The lake is also host to a number of protected aquatic species (listed in Annex II of EU Habitats Directive) including lamprey, Atlantic salmon, the endangered fish species pollan and otter.

Lough Derg is a designated SPA as it is of high ornithological importance for both wintering and breeding birds. It supports a nationally important breeding population of common tern (Annex I of EU Birds Directive), cormorant, great crested grebe, tufted duck and black-headed gull. In winter, it has nationally important numbers of tufted duck, golden eye and a range of other species including whooper swan (Annex I species) and Greenland white-fronted goose (Annex I species).

3.6.2.3 Rare and Protected Species of Flora and Fauna

The NPWS database of rare and protected species lists Irish fleabane as the only protected species from within the 10km square incorporating the site. This species is listed in the Irish Red Data Book (Curtis and McGough, 1988) and is protected under the Flora Protection Order (1999). In addition, a programme of translocation for the conservation of this species is currently underway along the lake edge at Lough Derg. The water germander (*Teucrium scordium*), not listed in the Flora Protection Order, is a rare plant found along the shores of Lough Derg and narrow-leaved helleborine (*Cephalanthera longifolia*) listed under the Flora Protections Order is also found. Other rare species include the stonewort (*Chara tomentosa*), which is present in shallow water around the lake and marsh pea (*Lathyrus palustris*) occurs on some of the callowland.

3.6.2.4 Fauna

Birds

Lough Derg is of importance for both breeding and wintering birds. The site is covered by IWeBs (Irish Wetland Birds Survey) and has been recorded as a nationally important breeding site for common tern. Large numbers of black-headed gull have traditionally bred on the many islands but the recent status of this species is not known. A large cormorant colony occurs in trees on the islands near Portumna. Lough Derg is also a noted breeding site for great crested grebe and tufted duck. In winter, the lake is important for a range of waterfowl species, especially diving ducks, with nationally important populations of tufted duck, goldeneye and mute swan. Other species, which occur, include cormorant, whooper swan, wigeon, teal, mallard, pochard, black-headed gull, coot, lapwing and little grebe. Lough Derg has traditionally been used by a relatively small flock of Greenland white-fronted goose based in the Lough Derg-Lough Graney area and possibly further afield (Crowe, 2005).

Mammals

Otter, a species listed on Annex II of the E.U. Habitats Directive occurs frequently within the site.

3.6.3 Option C – Parteen Basin

3.6.3.1 General Description of Study Area

A potential abstraction site has been identified along the south eastern shore of the Parteen Basin approximately 3km south of Killaloe. **Figure 4.7** in the Strategic Environmental Assessment Environmental Report provides a study area for Parteen Basin. The Parteen Basin is located on the lower Shannon River south of Lough Derg. The Shannon is dammed at the Parteen regulating weir forming a lake or reservoir from Killaloe to Parteen. On the southern part of the lake both shores are artificially embanked. In the past, extensive areas of land were flooded to form the lake. The dominant habitats found along the shore are improved agricultural grassland, wet grassland and marsh, with areas of reed and tall sedge swamp wet woodland and scrub.

3.6.3.2 Designated Areas

The study area is within the Lower River Shannon SAC. This very large site stretches along the Shannon valley from Killaloe to Loop Head/ Kerry Head, a distance of some 120 km. The Parteen Basin is located within the freshwater lower reaches of the River Shannon (between Killaloe and Limerick).

The Lower River Shannon is a designated SAC due to the occurrence of lagoons and alluvial wet woodlands, both habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for floating river vegetation, *Molinia* meadows, estuaries, tidal mudflats, Atlantic salt meadows,

Mediterranean salt meadows, *Salicornia* mudflats, sand banks, perennial vegetation of stony banks, sea cliffs, reefs and large shallow inlets and bays all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive – bottle-nosed dolphin (estuarine areas), sea lamprey, river lamprey, brook lamprey, freshwater pearl mussel, Atlantic salmon and otter.

3.6.3.3 Rare and Protected Species of Flora and Fauna

The NPWS database of rare and protected species lists the annual knawel (*Scleranthus annuus*) recorded at Castleconnell south of the study area at Parteen Basin and the Irish Red Data Book (Curtis and McGough, 1988) species opposite-leaved pondweed (*Groenlandia densa*) recorded in the Killaloe Canal north of the study area. Both plants are protected under the Flora Protection Order (1999).

3.6.3.4 Fauna

Otter has been recorded at Birdhill approximately 2km east of the study area (NPWS database, 2008) and also occurs along the River Shannon.

3.6.4 Option D – Lough Ree and Lough Derg

3.6.4.1 General description of study area

Option D proposes to combine water abstraction from two locations. **Figure 4.3** and **Figure 4.5** in the Strategic Environmental Assessment Environmental Report provides a study area for Lough Ree and Lough Derg. One proposed water abstraction location is within Lough Ree Special Area of Conservation (SAC 000440) and Special Protection Area (for birds) (SPA 004064). Refer to **Section 3.6.1.1** for a more detailed site description for Lough Ree. The second proposed water abstraction location is within Lough Derg, North East Shore Special Area of Conservation (SAC 002241) and Lough Derg (Shannon) Special Protection Area (for birds) (SPA 004058). Refer to **Section 3.6.2.1** for a more detailed site description for Lough Derg.

3.6.4.2 Designated Areas

Refer to Section **3.6.1.2** for details of Lough Ree SAC and SPA and **Section 3.6.2.2** for details of Lough Derg SAC and SPA.

3.6.4.3 Rare and Protected Species of Flora and Fauna

Refer to **Section 3.6.1.3** for a detailed list of protected species of flora and fauna for Lough Ree and **Section 3.6.2.3** for a detailed list of protected species of flora and fauna for Lough Derg.

3.6.4.4 Fauna

Refer to **Section 3.6.1.4** for Lough Ree and **Section 3.6.2.4** for Lough Derg.

3.6.5 Option E – Lough Ree and Storage

3.6.5.1 General Description of Study Area

Option E proposes abstractions from Lough Ree (see **Section 3.6.1**) to be combined with storage and available groundwater from former bogland areas in the midlands southeast of Rochfortbridge, Co. Westmeath. **Figure 4.11** in the Strategic Environmental Assessment Environmental Report provides a study area for the Midlands storage. The cutaway bog is a former Bord na Móna bog that has gone out of milled peat production and is currently being quarried for sand and gravel. The quarrying operation at the site has resulted in the creation of two large lakes. The overall area at this site is very extensive and the lakes make up a small portion of the overall former bog site. The Monagh River flows through the site and a few small areas of conifer and immature birch woodland occur along the borders. Elsewhere throughout the site, there is a mosaic of recolonising vegetation comprising wet heath, birch and willow scrub and wet grassland with large areas of bare peat still present. Some patches of open water occur where the water table is near the surface or where rainfall has been impounded.

3.6.5.2 Designated Areas

Refer to **Section 3.6.1.2** for details of Lough Ree SAC and SPA. The proposed bogland storage area is not within a designated area. The closest designated area is Raheenmore Bog SAC located within 5km southwest of the study area.

3.6.5.3 Rare and Protected Species of Flora and Fauna

Refer to **Section 3.6.1.3** for a detailed list of protected species of flora and fauna for Lough Ree. No records of rare or protected flora exist for the 10km grid square encompassing the bogland study area.

3.6.5.4 Fauna

Refer to **Section 3.6.1.4** for Lough Ree. The NPWS database contains records of otter occurring in the 10km grid squares N43 and N53 encompassing the bogland study area.

3.6.6 Option F1 – Lough Derg and Storage

3.6.6.1 General Description of Study Area

Option F1 proposes abstractions from Lough Derg (see **Section 3.6.2**) to be combined with storage and available groundwater from former bogland areas in the midlands southeast of Rochfortbridge, Co. Westmeath. **Figure 4.11** in the Strategic Environmental Assessment Environmental Report provides a study area for the Midlands storage. The cutaway bog is a former Bord na Móna bog that has gone out of milled peat production and is currently being quarried for sand and gravel. The quarrying operation at the site has resulted in the creation of two large lakes. The overall area at this site is very extensive and the lakes make up a small portion of the overall former bog site. The Monagh River flows through the site and a few small areas of conifer and immature birch woodland occur along the borders. Elsewhere throughout the site, there is a mosaic of recolonising vegetation comprising wet heath, birch and willow scrub and wet grassland with large areas of bare peat still present. Some patches of open water occur where the water table is near the surface or where rainfall has been impounded.

3.6.6.2

3.6.6.3 Designated Areas

Refer to **Section 3.6.2.2** for details of Lough Derg SAC and SPA.

3.6.6.4 Rare and Protected Species of Flora and Fauna

Refer to **Section 3.6.2.3** for a detailed list of protected species of flora and fauna for Lough Derg.

3.6.6.5 Fauna

Refer to **Section 3.6.2.4** for Lough Derg.

3.6.7 Option F2 – Lough Derg and Storage

3.6.7.1 General Description of Study Area

Option F2 proposes abstractions from Lough Derg (see **Section 3.6.2**) to be combined with storage in a cutaway bogland areas in the midlands east of Portarlington, Co Laois. **Figure 4.12** in the Strategic Environmental Assessment Environmental Report provides a study area for the Midlands storage. The bog is a former Bord na Móna bog that has gone out of milled peat production. The overall area at this site is very extensive and the site is recolonising with a mosaic of wet heath, birch and willow scrub and wet grassland with large areas of bare peat still present. Some patches of open water occur where the water table is near the surface or where rainfall has been impounded. The Cushina River flows from the south of the site and joins with the Figile River further downstream before joining the main channel of the River Barrow.

3.6.7.2 Designated Areas

Refer to **Section 3.6.2.2** for details of Lough Derg SAC and SPA.

3.6.7.3 Rare and Protected Species of Flora and Fauna

Refer to **Section 3.6.2.3** for a detailed list of protected species of flora and fauna for Lough Derg.

3.6.7.4 Fauna

Refer to **Section 3.6.2.4** for Lough Derg.

3.6.8 Option G – Lough Ree and Impoundment

3.6.8.1 General Description of Study Area

Option G proposes to abstract water from Lough Ree and impound the water at a location in the Wicklow Mountains. Refer to **Section 3.6.1** for Lough Ree abstraction details. **Figure 4.15** in the Strategic Environmental Assessment Environmental Report provides a study area for the Wicklow impoundment site.

The area proposed for impoundment in the Wicklow Mountains is a mixture of Coillte owned managed forest, agricultural land grazed mostly for sheep and a gravel quarry with some disused pits and some current activity also. Biodiversity is low as the area of land concerned is highly managed in one way or another.

3.6.8.2 Designated Areas

The study area does not fall within the boundaries of a designated area. There are two designated areas within 5km of the study area. Glenasmole Valley SAC is located immediately east of the study area and Wicklow Mountains National Park SAC/SPA occurs approximately 3km south of the study area.

3.6.8.3 Rare and Protected Species of Flora and Fauna

The NPWS data base of rare and protected species lists four vascular plant species from the 10km grid square O02 narrow-leaved helleborine *(Cephalanthera longifolia),* red hemp nettle *(Galeopsis angustifolia),* bog orchid *(Hammarbya paludosa)* and hairy violet (*Viola hirta)*. The small-white orchid (*Pseudorchis albida*) also occurs within the 10km grid square O01. All of these species are listed in the Irish Red Data Book (Curtis and McGough, 1988) and protected under the Flora Protection Order (1999).

3.6.8.4 Fauna

Mammals
Otter and pine marten are likely to occur owing to the close proximity of the study area to Wicklow Mountains National Park where both mammals have been recorded.

3.6.9 Option H – Desalination

3.6.9.1 General Description of Study Area

The study area is located along the coast between the towns of Rush and Skerries in North County Dublin. The landscape is gently undulating, sloping down towards the coast. This coastal area is noted for its geological interests: conglomerates of limestone and shale. Land use in the area is characterised by horticulture and mixed agriculture. Field boundaries are composed of low earth bank hedgerows and to a lesser extent, stone walls. These field boundary patterns testify to a long tradition of mixed agriculture. Due to the exposed conditions, mature trees are not common close to the coast, however, as one moves inland, hedgerows with mature trees and treelines are encountered more frequently. The Irish Sea is the prevailing influence and coastline is varied with exposed rocky shores and sandy beaches in sheltered coves.

3.6.9.2 Designated Areas

The study area does not fall within the boundaries of a designated area. **Figure 4.17** in the Strategic Environmental Assessment Environmental Report provides a study area for the Desalination Plant. There are a number of designated areas within a 5km radius of site. These are:

- Skerries Islands SPA (004122) including, Shenick Island, St. Patricks Island, Colt Island
- Lambay Island SAC (000204), SPA (004069)
- Rogerstown Estuary SPA (004015)/ SAC (000208)

These sites form an important network of protected areas, particularly for birds, in the greater Dublin Bay area. The Skerries Coast including the section of coastline within the study area is covered by IWeBs (Irish Wetland Birds Survey) and is considered a site of *National importance* for a number of bird species including common scoter, sanderling, turnstone and herring gull (Crowe, 2005).

In addition, the sea fronting rocks from Loughshinny to Rush are of national importance for their geological attributes being composed of conglomerates of limestones and shales (Goodwillie and Fahy, 1973),

3.6.9.3 Rare and Protected Species of Flora and Fauna

There are records of the Green winged orchid (*Orchis morio*), which is a protected plant under the Flora Protection Order (1999), north of Popeshall within the pNHA at Loughshinny Coast.

This area of North Co. Dublin is host to a number of rare plant species that were formally associated with sandy fallow land (Doogue, 1998). These include: white campion (*silene latifolia*), bugloss (*Anchusa arvensis*), small nettle (*Urtica urens*), prickly poppy (*Papaver argemone*), flixweed (*Descurainia Sophia*), purple ramping-fumitory (*Fumaria purpurea*).

3.6.9.4 Fauna

Mammals

The nearby Islands of Skerries Islands and Lambay Island are important sites for grey seals along the East Coast with individuals from these populations regularly using the north Dublin shoreline to haul out (Kiely *et al* 1999, O'Cadhla *et a*l, *in press*). Grey seals are listed in Annexes II and V of the EC Habitats Directive and are protected under the Wildlife (Amendment) Act 2000. Grey seals are regularly recorded in the area, with the islands particularly important for hauling out and breeding.

Birds

Peregrine falcon (Annex I of EU Bird Directive) was observed in flight (in pursuit of prey) at both Popeshall and Drumanagh study sites. There are records of peregrine nesting on the cliffs at Lambay (NPWS) and the bird observed may come from this population. The undisturbed sea cliffs along the Loughshinny coast may also provide suitable nesting habitat for this species.

A number of species of seabirds and waders were recorded within the study areas. Birds were recorded in flight (e.g. kittywake, curlew) and the rocky promontory exposed by the tide along the coast provides roost sites for many species including: common tern (Annex I, EU Birds Directive) oystercatcher, herring gull, lesser black-backed gull, heron and cormorant.

3.7 PHASE II SCREENING

3.7.1 Introduction

The Screening Matrix identifies all SAC sites within a uniform 15km radius of the outer boundary of the draft Plan study area (**Table 3.7**). These were screened using a tick box system to identify sites with potential to experience a likely significant effect due to the distance of that site form each option. Sites that have no physical, hydrological or other potential links with each option were eliminated.

3.7.2 Special Areas of Conservation

Table 3.7 identifies the Screening Phase for the Special Area of Conservation sites.

√ Potential for likely significant effects

X No significant effects

Table 3.7 Preliminary Screening Phase - SAC

Site ID	Site	A	B	C	D	E	F1	F2	G	H
1	Ballinturly Turlough	X	X	X	X	X	X	X	X	X
2	Lisduff Turlough	X	X	X	X	X	X	X	X	X
3	Four Roads Turlough	X	X	X	X	X	X	X	X	X
4	Killeglan Grassland	X	X	X	X	X	X	X	X	X
5	Glenloughaun Esker	X	X	X	X	X	X	X	X	X
6	Lough Croan Turlough	X	X	X	X	X	X	X	X	X
7	Annaghmore Lough (Roscommon)	X	X	X	X	X	X	X	X	X
8	Lough Funshinagh	√	X	X	√	√	X	X	√	X
9	Ballynamona Bog and Corklip Lough	X	X	X	X	X	X	X	X	X
10	Castleampson Esker	X	X	X	X	X	X	X	X	X
11	Lough Ree	√	√	√	√	√	√	√	√	X
12	Corbo Bog	√	X	X	√	√	X	X	√	X
13	Fortwilliam Turlough	√	X	X	√	√	X	X	√	X
14	River Shannon Callows	√	√	√	√	√	√	√	√	X
15	Fin Lough (Offaly)	√	√	√	√	√	√	√	√	X
16	Mongan Bog	√	√	X	√	√	√	√	√	X
17	Pilgrims Road Esker	X	X	X	X	X	X	X	X	X
18	Moyclare Bog	X	X	X	X	X	X	X	X	X
19	Ferbane Bog	X	X	X	X	X	X	X	X	X
20	Crosswood Bog	X	X	X	X	X	X	X	X	X
21	Carn Park Bog	X	X	X	X	X	X	X	X	X
22	Brown Bog	X	X	X	X	X	X	X	X	X
23	Lough Forbes Complex	√	√	√	√	√	√	√	√	X
24	Clooneen Bog	X	X	X	X	X	X	X	X	X
25	Clara Bog	X	X	X	X	X	X	X	X	X
26	Charleville Wood	X	X	X	X	X	X	X	X	X
27	Ballymore Fen	X	X	X	X	X	X	X	X	X
28	Ardagullion Bog	X	X	X	X	X	X	X	X	X
29	Lough Oughter and Associated Loughs	X	X	X	X	X	X	X	X	X
30	Moneybeg and Castleisland Bogs	X	X	X	X	X	X	X	X	X
31	White Lough, Ben Loughs and Lough Doo	X	X	X	X	X	X	X	X	X
32	Lough Bane and Lough Glass	X	X	X	X	X	X	X	X	X
33	Garriskill Bog	X	X	X	X	X	X	X	X	X

Site ID	Site	A	B	C	D	E	F1	F2	G	H
34	Lough Lene	X	X	X	X	X	X	X	X	X
35	Lough Owel	X	X	X	X	X	X	X	X	X
36	Lough Ennell	X	X	X	X	X	X	X	X	X
37	Split Hills and Long Hill Esker	X	X	X	X	X	X	X	X	X
38	Raheenmore Bog	X	X	X	X	√	√	X	X	X
39	River Boyne and River Blackwater	X	X	X	X	X	X	X	X	X
40	Kilconny Bog (Cloghbally)	X	X	X	X	X	X	X	X	X
41	Mount Hevey Bog	X	X	X	X	X	X	X	X	X
42	The Long Derries, Edenderry	X	X	X	X	X	X	X	X	X
43	Pollardstown Fen	X	X	X	X	X	X	X	X	X
44	Mouds Bog	X	X	X	X	X	X	X	X	X
45	Ballynafagh Lake	X	X	X	X	X	X	X	X	X
46	Ballynafagh Bog	X	X	X	X	X	X	X	X	X
47	Red Bog, Kildare	X	X	X	X	X	X	X	√	X
48	Rye Water Valley/Carton	X	X	X	X	X	X	X	X	X
49	Dundalk Bay	X	X	X	X	X	X	X	X	X
50	Clogher Head	X	X	X	X	X	X	X	X	X
51	Boyne Coast and Estuary	X	X	X	X	X	X	X	X	√
52	Rogerstown Estuary	X	X	X	X	X	X	X	X	√
53	Lambay island	X	X	X	X	X	X	X	X	√
54	Malahide Estuary	X	X	X	X	X	X	X	X	√
55	Baldoyle Bay	X	X	X	X	X	X	X	X	√
56	Ireland's Eye	X	X	X	X	X	X	X	X	√
57	Howth Head	X	X	X	X	X	X	X	X	X
58	North Dublin Bay	X	X	X	X	X	X	X	X	X
59	South Dublin Bay	X	X	X	X	X	X	X	X	X
60	Bray Head	X	X	X	X	X	X	X	X	X
61	Ballyman Glen	X	X	X	X	X	X	X	X	X
62	Knocksink Wood	X	X	X	X	X	X	X	X	X
63	Glenasmole Valley	X	X	X	X	X	X	X	√	X
64	Wicklow Mountains	X	X	X	X	X	X	X	√	X
65	Lower River Shannon	√	√	√	√	√	√	√	√	X
66	Ratty River Cave	X	X	X	X	X	X	X	X	X
67	Kilkishen House	X	X	X	X	X	X	X	X	X
68	Danes Hole, Poulnalecka	X	X	X	X	X	X	X	X	X
69	Glendree Bog	X	X	X	X	X	X	X	X	X
70	Tory Hill	X	X	X	X	X	X	X	X	X
71	Glenomra Wood	X	X	X	X	X	X	X	X	X

Site ID	Site	A	B	C	D	E	F1	F2	G	H
72	Slieve Bernagh Bog	X	X	X	X	X	X	X	X	X
73	Loughatorick South Bog	√	√	X	√	√	√	√	√	X
74	Pollagoona Bog	√	√	X	√	√	√	√	√	X
75	Derrycrag Wood Nature Reserve	√	√	X	√	√	√	√	√	X
76	Pollnaknockaun Wood Nature Reserve	√	√	X	√	√	√	√	√	X
77	Rosturra Wood	X	X	X	X	X	X	X	X	X
78	Cloonmoylan Bog	√	√	X	√	√	√	√	√	X
79	Barroughter Bog	√	√	X	√	√	√	√	√	X
80	Lough Derg, North East Shore	√	√	√	√	√	√	√	√	X
81	Ardgraigue Bog	√	X	X	√	√	X	X	√	X
82	Redwood Bog	√	√	X	√	√	√	√	√	X
83	All Saints Bog and Esker	√	√	X	√	√	√	√	√	X
84	Ridge Road, SW of Rapemills	X	X	X	X	X	X	X	X	X
85	Ballyduff/Clonfinane Bog	√	X	X	√	√	X	X	√	X
86	Kilcarren-Firville Bog	√	√	X	√	√	√	√	√	X
87	Liskeenan Fen	√	√	X	√	√	√	√	√	X
88	Sharavogue Bog	X	X	X	X	X	X	X	X	X
89	Lisduff Fen	X	X	X	X	X	X	X	X	X
90	Island Fen	X	X	X	X	X	X	X	X	X
91	Kilduff, Devilsbit Mountain	X	X	X	X	X	X	X	X	X
92	Silvermine Mountains	X	X	X	X	X	X	X	X	X
93	Silvermine Mountains West	X	X	X	X	X	X	X	X	X
94	Bolingbrook Hill	X	X	X	X	X	X	X	X	X
95	Keeper Hill	X	X	X	X	X	X	X	X	X
96	Clare Glen	X	X	X	X	X	X	X	X	X
97	Glenstal Wood	X	X	X	X	X	X	X	X	X
98	Lower River Suir	X	X	X	X	X	X	X	X	X
99	Philipston Marsh	X	X	X	X	X	X	X	X	X
100	Anglesey Road	X	X	X	X	X	X	X	X	X
101	River Barrow and River Nore	X	X	X	X	X	X	√	X	X
102	The Loughans	X	X	X	X	X	X	X	X	X
103	Spahill and Clomantagh Hill	X	X	X	X	X	X	X	X	X
104	Cullahill Mountain	X	X	X	X	X	X	X	X	X
105	Galmoy Fen	X	X	X	X	X	X	X	X	X
106	Knockacoller Bog	X	X	X	X	X	X	X	X	X
107	Coolrain Bog	X	X	X	X	X	X	X	X	X
108	Slieve Bloom Mountains	X	X	X	X	X	X	X	X	X

Site ID	Site	A	B	C	D	E	F1	F2	G	H
109	Clonaslee Eskers and Derry Bog	X	X	X	X	X	X	X	X	X
110	Mountmellick	X	X	X	X	X	X	X	X	X
111	Ballyprior Grassland	X	X	X	X	X	X	X	X	X
112	Thomastown Quarry	X	X	X	X	X	X	X	X	X
113	Tramore Dunes and Backstrand	X	X	X	X	X	X	X	X	X
114	Bannow Bay	X	X	X	X	X	X	X	X	X
115	Blackstairs Mountains	X	X	X	X	X	X	X	X	X
116	Slaney River Valley	X	X	X	X	X	X	X	X	X
117	Holdenstown Bog	X	X	X	X	X	X	X	X	X
118	Vale of Clara (Rathdrum Wood)	X	X	X	X	X	X	X	X	X
119	The Murrough Wetlands	X	X	X	X	X	X	X	X	X
120	Carriggower Bog	X	X	X	X	X	X	X	X	X
121	Glen of the Downs	X	X	X	X	X	X	X	X	X
122	Scragh Bog	X	X	X	X	X	X	X	X	X
123	Lisbigney Bog	X	X	X	X	X	X	X	X	X

Following elimination of sites, a summary of the remaining SAC sites with potential to experience a likely significant effect by each option is presented for further assessment **Table 3.8**.

Table 3.8 Summary of SAC Sites After Preliminary Exclusion

Site ID	Site	A	B	C	D	E	F1	F2	G	H
8	Lough Funshinagh	√	X	X	√	X	X	X	√	X
11	Lough Ree	√	√	√	√	√	√	√	√	X
12	Corbo Bog	√	X	X	√	X	X	X	√	X
13	Fortwilliam Turlough	√	X	X	√	X	X	X	√	X
14	River Shannon Callows	√	√	√	√	√	√	√	√	X
15	Fin Lough (Offaly)	√	√	√	√	√	√	√	√	X
16	Mongan Bog	√	√	X	√	√	√	√	√	X
23	Lough Forbes Complex	√	√	√	√	√	√	√	√	X
38	Raheenmore Bog	X	X	X	X	√	√	√	X	X
47	Red Bog, Kildare	X	X	X	X	X	X	X	√	X
51	Boyne Coast and Estuary	X	X	X	X	X	X	X	X	√
52	Rogerstown Estuary	X	X	X	X	X	X	X	X	√
53	Lambay island	X	X	X	X	X	X	X	X	√
54	Malahide Estuary	X	X	X	X	X	X	X	X	√

Site ID	Site	A	B	C	D	E	F1	F2	G	H
55	Baldoyle Bay	X	X	X	X	X	X	X	X	√
56	Ireland's Eye	X	X	X	X	X	X	X	X	√
63	Glenasmole Valley	X	X	X	X	X	X	X	√	X
64	Wicklow Mountains	X	X	X	X	X	X	X	√	X
65	Lower River Shannon	√	√	√	√	√	√	√	√	X
73	Loughatorick South Bog	√	√	X	√	√	√	√	√	X
74	Pollagoona Bog	√	√	X	√	√	√	√	√	X
75	Derrycrag Wood Nature Reserve	√	√	X	√	√	√	√	√	X
76	Pollnaknockaun Wood Nature Reserve	√	√	X	√	√	√	√	√	X
78	Cloonmoylan Bog	√	√	X	√	√	√	√	√	X
79	Barroughter Bog	√	√	X	√	√	√	√	√	X
80	Lough Derg, North East Shore	√	√	√	√	√	√	√	√	X
81	Ardgraigue Bog	√	X	X	√	√	X	X	√	X
82	Redwood Bog	√	√	X	√	√	√	√	√	X
83	All Saints Bog and Esker	√	√	X	√	√	√	√	√	X
85	Ballyduff/Clonfinane Bog	√	X	X	√	√	X	X	√	X
86	Kilcarren-Firville Bog	√	√	X	√	√	√	√	√	X
87	Liskeenan Fen	√	√	X	√	√	√	√	√	X
101	River Barrow and River Nore	X	X	X	X	X	X	√	X	X

3.7.3 Special Protection Area (SPA)

The Screening Matrix identifies all SPA sites within a uniform 15km radius of the outer boundary of the draft Plan study area **(Table 3.9).** These were screened using a tick box system to identify sites with potential to experience a likely significant effect due to the distance of that site form each option. Sites that have no physical, hydrological or other potential links with each option were eliminated.

Table 3.9 Preliminary Screening Phase - SPA

Site ID	Site	A	B	C	D	E	F1	F2	G	H
1	River Suck Callows	√	√	√	√	√	√	√	√	X
2	Middle Shannon Callows	√	√	√	√	√	√	√	√	X
3	Lough Ree	√	√	√	√	√	√	√	√	X
4	Mongan Bog	√	√	X	√	√	√	√	√	X
5	Ballykenny-Fishertown Bog	X	X	X	X	X	X	X	X	X
6	Glen Lough	X	X	X	X	X	X	X	X	X

Site ID	Site	A	B	C	D	E	F1	F2	G	H
7	Lough Oughter	X	X	X	X	X	X	X	X	X
8	Lough Iron	X	X	X	X	X	X	X	X	X
9	Garriskill Bog	X	X	X	X	X	X	X	X	X
10	Lough Kinale and Derragh Lough	X	X	X	X	X	X	X	X	X
11	Lough Ennell	X	X	X	X	X	X	X	X	X
12	Lough Owel	X	X	X	X	X	X	X	X	X
13	Lough Derravaragh	X	X	X	X	X	X	X	X	X
14	Lough Sheelin	X	X	X	X	X	X	X	X	X
15	Stabannan-Braganstown	X	X	X	X	X	X	X	X	X
16	Dundalk Bay	X	X	X	X	X	X	X	X	X
17	Boyne Estuary	X	X	X	X	X	X	X	X	√
18	River Nanny Estuary and Shore	X	X	X	X	X	X	X	X	√
19	Rockabill	X	X	X	X	X	X	X	X	√
20	Skerries Islands	X	X	X	X	X	X	X	X	√
21	Rogerstown Estuary	X	X	X	X	X	X	X	X	√
22	Lambay Island	X	X	X	X	X	X	X	X	√
23	Broadmeadow/Swords Estuary	X	X	X	X	X	X	X	X	√
24	Baldoyle Bay	X	X	X	X	X	X	X	X	√
25	Irelands Eye	X	X	X	X	X	X	X	X	√
26	Howth Head Coast	X	X	X	X	X	X	X	X	√
27	North Bull Island	X	X	X	X	X	X	X	X	√
28	Sandymount Strand/Tolka Estuary	X	X	X	X	X	X	X	X	√
29	River Shannon and River Fergus Estuaries	√	√	√	√	√	√	√	√	X
30	Slieve Aughty Mountains	X	X	X	X	X	X	X	X	X
31	Lough Derg (Shannon)	X	√	√	√	X	√	√	√	X
32	Slievefelim to Silvermines Mountains	X	X	X	X	X	X	X	X	X
33	River Little Brosna Callows	√	√	√	√	√	√	√	√	X
34	All Saints Bog	√	√	X	√	√	√	√	√	X
35	Dovegrove Callows	X	X	X	X	X	X	X	X	X
36	Slieve Bloom Mountains	X	X	X	X	X	X	X	X	X
37	Poulaphouca Reservoir	X	X	X	X	X	X	X	√	X
38	Wicklow Mountains	X	X	X	X	X	X	X	√	X
39	The Murrough	X	X	X	X	X	X	X	X	X
40	Wexford Harbour and Slobs	X	X	X	X	X	X	X	X	X
41	Bannow Bay	X	X	X	X	X	X	X	X	X
42	Tramore Back Strand	X	X	X	X	X	X	X	X	X

Following elimination of sites, a summary of the remaining SPA sites with potential to experience a likely significant effect by each option is presented for further assessment, **Table 3.10**

Table 3.10 Summary of SPA Sites After Preliminary Exclusion

Site ID		A	B	C	D	E	F1	F2	G	H
1	River Suck Callows	√	√	√	√	√	√	√	√	X
2	Middle Shannon Callows	√	√	√	√	√	√	√	√	X
3	Lough Ree	√	√	√	√	√	√	√	√	X
4	Mongan Bog	√	√	X	√	√	√	√	√	X
17	Boyne Estuary	X	X	X	X	X	X	X	X	√
18	River Nanny Estuary and Shore	X	X	X	X	X	X	X	X	√
19	Rockabill	X	X	X	X	X	X	X	X	√
20	Skerries Islands	X	X	X	X	X	X	X	X	√
21	Rogerstown Estuary	X	X	X	X	X	X	X	X	√
22	Lambay Island	X	X	X	X	X	X	X	X	√
23	Broadmeadow/Swords Estuary	X	X	X	X	X	X	X	X	√
24	Baldoyle Bay	X	X	X	X	X	X	X	X	√
25	Irelands Eye	X	X	X	X	X	X	X	X	√
26	Howth Head Coast	X	X	X	X	X	X	X	X	√
27	North Bull Island	X	X	X	X	X	X	X	X	√
28	Sandymount Strand/Tolka Estuary	X	X	X	X	X	X	X	X	√
29	River Shannon and River Fergus Estuaries	√	√	√	√	√	√	√	√	X
31	Lough Derg (Shannon)	√	√	√	√	√	√	√	√	X
33	River Little Brosna Callows	√	√	√	√	√	√	√	√	X
34	All Saints Bog	√	√	X	√	√	√	√	√	X
37	Poulaphouca Reservoir	X	X	X	X	X	X	X	√	X
38	Wicklow Mountains	X	X	X	X	X	X	X	√	X

3.8 PHASE III SCREENING

3.8.1 Potential Physical Effects from the Options

Table 3.11 to **Table 3.19** detail the potential impacts of the elements of the draft Plans Options A – H. Within each of the tables the physical characteristics and potential effects of each option is outlined.

Table 3.11 Potential Impacts of the Elements of Option A

Option A: Lough Ree	Physical Characteristics	Potential Effects
	Surface water abstraction	Fluctuations in surface water levels
	Abstraction pipe	Low flows
	Pump house	Increase in residence time
	Water treatment plant	Direct loss of habitat
	Land pipeline	

Table 3.12 Potential Impacts of the Elements of Option B

Option B: Lough Derg	Physical Characteristics	Potential Effects
	Surface water abstraction	Fluctuations in surface water levels
	Abstraction pipe	Low flows
	Pump house	Increase in residence time
	Water treatment plant	Direct loss of habitat
	Land pipeline	

Table 3.13 Potential Impacts of the Elements of Option C

Option C: Parteen Basin	Physical Characteristics	Potential Effects
	Surface water abstraction	Fluctuations in surface water levels
	Abstraction pipe	Low flows
	Pump house	Increase in residence time
	Water treatment plant	Direct loss of habitat
	Land pipeline	

Table 3.14 Potential Impacts of the Elements of Option D

Option D: Lough Ree & Lough Derg	Physical Characteristics	Potential Effects
	Surface water abstraction	Fluctuations in surface water levels
	Abstraction pipe	Low flows
	Pump house	Increase in residence time
	Water treatment plant	Direct loss of habitat
	Land pipeline	

Table 3.15 Potential Impacts of the Elements of Option E

Option E: Lough Ree & Storage	Physical Characteristics	Potential Effects
	Surface water abstraction	Fluctuations in surface water levels
	Abstraction pipe	Low flows
	Pump house	Increase in residence time
	Water treatment plant	Direct loss of habitat
	Land pipeline	

Table 3.16 Potential Impacts of the Elements of Option F1

Option F1: Lough Derg & Storage	Physical Characteristics	Potential Effects
	Surface water abstraction	Fluctuations in surface water levels
	Abstraction pipe	Low flows
	Pump house	Increase in residence time
	Water treatment plant	Direct loss of habitat
	Land pipeline	

Table 3.17 Potential Impacts of the Elements of Option F2

Option F2: Lough Derg & Storage	Physical Characteristics	Potential Effects
	Surface water abstraction	Fluctuations in surface water levels
	Abstraction pipe	Low flows
	Pump house	Increase in residence time
	Water treatment plant	Direct loss of habitat
	Land pipeline	

Table 3.18 Potential Impacts of the Elements of Option G

Option G: Lough Ree or Lough Derg & Impoundment	Physical Characteristics	Potential Effects
	Surface water abstraction	Fluctuations in surface water levels
	Abstraction pipe	Low flows
	Pump station and booster	Increase in residence time
	Water treatment plant	Direct loss of habitat
	Land pipeline	Fluctuations in groundwater levels
	Dam and reservoir construction	

Table 3.19 Potential Impacts of the Elements of Option H

Option H: Desalination	Physical Characteristics	Potential Effects
	Sea water abstraction	Discharge of coagulant, antiscalant and brine to sea
	Abstraction pipe	Changes in chemical composition of seawater
	Desalination plant	Direct loss of habitat
	Land pipeline	

3.8.2 Potential Types of Deterioration / Disturbance

Table 3.20 lists the types of environmental deterioration/ disturbance that could in general be incurred and this is then assessed in relation to each of the European sites that did not pass the second phase screening matrix.

Table 3.20 Potential Types of Deterioration / Disturbance

Type of Deterioration/ Disturbance	Categories
Physical Loss	Removal Smothering
Physical Damage	Changes in land management practices Prevention of natural erosion - coastal defences - flood defences Mineral extraction Water abstraction Recreational pressure
Non Physical Disturbance	Noise/ visual presence - recreational - industrial - transport/ navigation
Toxic Contamination	Water pollution - agricultural runoff - domestic - industrial Air Pollution
Non Toxic Contamination	Nutrient enrichment Changes in thermal regimes (e.g. power stations) Changes in turbidity (e.g. flood defences) Changes in water levels (e.g. water abstraction) Changes in salinity (e.g. water abstraction)
Biological Disturbance	Introduction of non native species Selective extraction of species

Reference: East of England Regional Spatial Strategy

The potential effects of Options A to H on the remaining European sites are assessed against a list of environmental deterioration/disturbance types in **Tables 3.21-3.29** with a summary table (**Table 3.30**) detailing impacts of different options. These include direct habitat loss, indirect impacts (particularly hydrological changes), toxic contamination/pollution, non-toxic contamination and disturbance. A European site is automatically brought forward to Stage 2 - Appropriate Assessment where '*Yes'* is identified for ANY of the deterioration/disturbance types for a particular site. Definitions and an outline of the rationale used are given below.

Direct habitat loss

Direct habitat loss is identified as the loss or damage of habitat through physical removal or other damaging activities.

Indirect Impacts

These are effects on habitats brought about by means other than direct impacts. Most typically they will result from changes in the hydrological regime that will in turn alter the nature of water-dependant habitats. Sites have been classified as '***Yes***' where there is any potential for an indirect impact on a site. The extent of the impact will depend on the proximity of the site to the study area, its location within the catchment, the hydrological connections and habitat sensitivities. The qualifying interests of these sites are habitats that are either groundwater-fed fens, which are highly sensitive to changes in groundwater, or other peat lands, such as raised bogs, which although predominantly rainwater fed could still be still susceptible to changes in groundwater levels. The hydrology of each site will require further clarification in order to identify the probability and extent of potential impact occurring.

Sites have been classified as '***No***' where there is no surface water connection; where qualifying interests are not surface or groundwater dependant or where the site is beyond the influence of changes within the associated catchment. A change in the hydrological regime is taken as any alteration to the standard hydrological variables of water quality and quantity.

Water quantity includes:

- Flow regime
- Water depth/level
- Duration and frequency/periodicity of spray (by salt water or fresh water) and /or precipitation
- Humidity level

Water quality includes:

- Chemical constituents of the water (including pH and conductivity)
- Trophic status
- Toxic pollutants in the water
- Physical parameters such as temperature, among others

Toxic contamination/pollution

The introduction of a substance that is harmful to living organisms and that leads to a negative change in the environment.

Non-toxic contamination

The introduction of a substance that is not harmful but at certain concentrations may lead to a change in the environment e.g. increased salinity levels.

Disturbance to protected species listed on Annex I of the Birds Directive

Any event created by humans resulting in an interruption of activities or an alteration in normal behaviour of species.

3.8.2.1 Screening Special Areas of Conservation

Table 3.21 to **Table 3.30** provides details on the final screening phase within Stage 1. In the Table AA represents Appropriate Assessment.

Table 3.21 Option A Lough Ree: SAC Sites

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts to habitats - hydrological impacts**	**Toxic contamination/ pollution**	**Non-toxic contamination**	**Disturbance to protected species listed on Annex II and IV of Habitats Directive**	**AA required (Y or N)**
Lough Funshinagh	No	Yes	No	No	No	Yes
Lough Ree	Yes	Yes	No	No	Yes	Yes
Corbo Bog	No	Yes	No	No	No	Yes
Fortwilliam Turlough	No	Yes	No	No	No	Yes
River Shannon Callows	No	Yes	No	No	No	Yes
Fin Lough (Offaly)	No	Yes	No	No	No	Yes
Lough Forbes Complex	No	Yes	No	No	No	Yes
Mongan Bog	No	Yes	No	No	No	Yes
Lower River Shannon	No	Yes	No	No	No	Yes
Loughatorick South Bog	No	No	No	No	No	No
Pollagoona Bog	No	No	No	No	No	No
Derrycrag Wood N.R.	No	No	No	No	No	No
Pollnaknockaun Wood N.R.	No	No	No	No	No	No
Cloonmoylan Bog	No	Yes	No	No	No	Yes
Barroughter Bog	No	Yes	No	No	No	Yes
Lough Derg, North East Shore	No	Yes	No	No	No	Yes
Ardgraigue Bog	No	No	No	No	No	No
Redwood Bog	No	Yes	No	No	No	Yes
All Saints Bog and Esker	No	Yes	No	No	No	Yes
Ballyduff/Clonfinane Bog	No	No	No	No	No	No
Kilcarren-Firville Bog	No	Yes	No	No	No	Yes
Liskeenan Fen	No	Yes	No	No	No	Yes

Table 3.22 Option B Lough Derg: SAC Sites

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts to habitats - hydrological impacts**	**Toxic contaminati on/ pollution**	**Non-toxic contaminati on**	**Disturbance to protected species listed on Annex II and IV of Habitats Directive**	**AA required (Y or N)**
Lough Ree	No	Yes	No	No	No	Yes
River Shannon Callows	No	Yes	No	No	No	Yes
Fin Lough (Offaly)	No	Yes	No	No	No	Yes
Lough Forbes Complex	No	Yes	No	No	No	Yes
Mongan Bog	No	Yes	No	No	No	Yes
Lower River Shannon	No	Yes	No	No	No	Yes
Loughatorick South Bog	No	No	No	No	No	No
Pollagoona Bog	No	No	No	No	No	No
Derrycrag Wood N.R.	No	No	No	No	No	No
Pollnaknockaun Wood N.R.	No	No	No	No	No	No
Cloonmoylan Bog	No	Yes	No	No	No	Yes
Barroughter Bog	No	Yes	No	No	No	Yes
Lough Derg, North East Shore	Yes	Yes	No	No	Yes	Yes
Redwood Bog	No	Yes	No	No	No	Yes
All Saints Bog and Esker	No	Yes	No	No	No	Yes
Kilcarren-Firville Bog	No	Yes	No	No	No	Yes
Liskeenan Fen	No	Yes	No	No	No	Yes

Table 3.23 Option C Parteen Basin: SAC Sites

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts to habitats- hydrological impacts**	**Toxic contaminati on/ pollution**	**Non-toxic contaminati on**	**Disturbance to protected species listed on Annex II and IV of Habitats Directive**	**AA required (Y or N)**
Lough Ree	No	Yes	No	No	No	Yes
River Shannon Callows	No	Yes	No	No	No	Yes
Fin Lough (Offaly)	No	Yes	No	No	No	Yes
Lough Forbes Complex	No	Yes	No	No	No	Yes
Lower River Shannon	No	Yes	No	No	No	Yes
Lough Derg, North East Shore	No	Yes	No	No	No	Yes

Table 3.24 Option D Lough Ree and Lough Derg: SAC Sites

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts to habitats- hydrological impacts**	**Toxic contamination/ pollution**	**Non-toxic contamination**	**Disturbance to protected species listed on Annex II and IV of Habitats Directive**	**AA required (Y or N)**
Lough Funshinagh	No	Yes	No	No	No	Yes
Lough Ree	Yes	Yes	No	No	Yes	Yes
Corbo Bog	No	Yes	No	No	No	Yes
Fortwilliam Turlough	No	Yes	No	No	No	Yes
River Shannon Callows	No	Yes	No	No	No	Yes
Fin Lough (Offaly)	No	Yes	No	No	No	Yes
Lough Forbes Complex	No	Yes	No	No	No	Yes
Mongan Bog	No	Yes	No	No	No	Yes
Loughatorick South Bog	No	No	No	No	No	No
Pollagoona Bog	No	No	No	No	No	No
Derrycrag Wood N.R.	No	No	No	No	No	No
Pollnaknockaun Wood N.R.	No	No	No	No	No	No
Cloonmoylan Bog	No	Yes	No	No	No	Yes
Barroughter Bog	No	Yes	No	No	No	Yes
Lough Derg, North East Shore	Yes	Yes	No	No	Yes	Yes
Ardgraigue Bog	No	No	No	No	No	No
Redwood Bog	No	Yes	No	No	No	Yes
All Saints Bog and Esker	No	Yes	No	No	No	Yes
Ballyduff/Clonfinane Bog	No	No	No	No	No	No
Kilcarren-Firville Bog	No	Yes	No	No	No	Yes
Liskeenan Fen	No	Yes	No	No	No	Yes

Table 3.25 Option E Lough Ree and Storage: SAC Sites

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts to habitats - hydrological impacts**	**Toxic contaminati on/ pollution**	**Non-toxic contaminati on**	**Disturbance to protected species listed on Annex II and IV of Habitats Directive**	**AA required (Y or N)**
Lough Funshinagh	No	Yes	No	No	No	Yes
Lough Ree	Yes	Yes	No	No	Yes	Yes
Corbo Bog	No	Yes	No	No	No	Yes
Fortwilliam Turlough	No	Yes	No	No	No	Yes
River Shannon Callows	No	Yes	No	No	No	Yes
Fin Lough (Offaly)	No	Yes	No	No	No	Yes
Lough Forbes Complex	No	Yes	No	No	No	Yes
Mongan Bog	No	Yes	No	No	No	Yes
Raheenmore Bog	No	Yes	No	No	No	Yes
Lower River Shannon	No	Yes	No	No	No	Yes
Loughatorick South Bog	No	No	No	No	No	No
Pollagoona Bog	No	No	No	No	No	No
Derrycrag Wood N.R.	No	No	No	No	No	No
Pollnaknockaun Wood N.R.	No	No	No	No	No	No
Cloonmoylan Bog	No	Yes	No	No	No	Yes
Barroughter Bog	No	Yes	No	No	No	Yes
Lough Derg, North East Shore	No	Yes	No	No	No	Yes
Ardgraigue Bog	No	No	No	No	No	No
Redwood Bog	No	Yes	No	No	No	Yes
All Saints Bog and Esker	No	Yes	No	No	No	Yes
Ballyduff/Clonfinane Bog	No	No	No	No	No	No
Kilcarren-Firville Bog	No	Yes	No	No	No	Yes
Liskeenan Fen	No	Yes	No	No	No	Yes

Table 3.26 Option F1 Lough Derg and storage: SAC Sites

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts to habitats - hydrological impacts**	**Toxic contamination/ pollution**	**Non-toxic contamination**	**Disturbance to protected species listed on Annex II and IV of Habitats Directive**	**AA required (Y or N)**
Lough Ree	No	Yes	No	No	No	Yes
River Shannon Callows	No	Yes	No	No	No	Yes
Fin Lough (Offaly)	No	Yes	No	No	No	Yes
Lough Forbes Complex	No	Yes	No	No	No	Yes
Raheenmore Bog	No	Yes	No	No	No	Yes
Mongan Bog	No	Yes	No	No	No	Yes
Lower River Shannon	No	Yes	No	No	No	Yes
Loughatorick South Bog	No	No	No	No	No	No
Pollagoona Bog	No	No	No	No	No	No
Derrycrag Wood N.R.	No	No	No	No	No	No
Pollnaknockaun Wood N.R.	No	No	No	No	No	No
Cloonmoylan Bog	No	Yes	No	No	No	Yes
Barroughter Bog	No	Yes	No	No	No	Yes
Lough Derg, North East Shore	Yes	Yes	No	No	Yes	Yes
Redwood Bog	No	Yes	No	No	No	Yes
All Saints Bog and Esker	No	Yes	No	No	No	Yes
Kilcarren-Firville Bog	No	Yes	No	No	No	Yes
Liskeenan Fen	No	Yes	No	No	No	Yes

Table 3.27 Option F2 Lough Derg and Storage: SAC Sites

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts to habitats - hydrological impacts**	**Toxic contamination/ pollution**	**Non-toxic contamination**	**Disturbance to protected species listed on Annex II and IV of Habitats Directive**	**AA required (Y or N)**
Lough Ree	No	Yes	No	No	No	Yes
River Shannon Callows	No	Yes	No	No	No	Yes
Fin Lough (Offaly)	No	Yes	No	No	No	Yes
Lough Forbes Complex	No	Yes	No	No	No	Yes

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts to habitats - hydrological impacts**	**Toxic contamination/ pollution**	**Non-toxic contamination**	**Disturbance to protected species listed on Annex II and IV of Habitats Directive**	**AA required (Y or N)**
Mongan Bog	No	Yes	No	No	No	Yes
Lower River Shannon	No	Yes	No	No	No	Yes
Loughatorick South Bog	No	No	No	No	No	No
Pollagoona Bog	No	No	No	No	No	No
Derrycrag Wood N.R.	No	No	No	No	No	No
Pollnaknockaun Wood N.R.	No	No	No	No	No	No
Cloonmoylan Bog	No	Yes	No	No	No	Yes
Barroughter Bog	No	Yes	No	No	No	Yes
Lough Derg, North East Shore	Yes	Yes	No	No	Yes	Yes
Redwood Bog	No	Yes	No	No	No	Yes
All Saints Bog and Esker	No	Yes	No	No	No	Yes
Kilcarren-Firville Bog	No	Yes	No	No	No	Yes
Liskeenan Fen	No	Yes	No	No	No	Yes
River Barrow and River Nore	No	Yes	No	No	No	Yes

Table 3.28 Option G Lough Derg/ Ree and Impoundment: SAC Sites

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts to habitats**	**Toxic contamination/ pollution**	**Non-toxic contamination**	**Disturbance to protected species listed on Annex II and IV of Habitats Directive**	**AA required (Y or N)**
Lough Funshinagh	No	Yes	No	No	No	Yes
Lough Ree	Yes	Yes	No	No	Yes	Yes
Corbo Bog	No	Yes	No	No	No	Yes
Fortwilliam Turlough	No	Yes	No	No	No	Yes
River Shannon Callows	No	Yes	No	No	No	Yes
Fin Lough (Offaly)	No	Yes	No	No	No	Yes
Lough Forbes Complex	No	Yes	No	No	No	Yes
Mongan Bog	No	Yes	No	No	No	Yes
Red Bog, Kildare	No	No	No	No	No	No

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts to habitats**	**Toxic contamination/ pollution**	**Non-toxic contamination**	**Disturbance to protected species listed on Annex II and IV of Habitats Directive**	**AA required (Y or N)**
Glenasmole Valley	No	Yes	No	No	No	Yes
Wicklow Mountains	Yes	Yes	No	No	Yes	Yes
Lower River Shannon	No	Yes	No	No	No	Yes
Loughatorick South Bog	No	No	No	No	No	No
Pollagoona Bog	No	No	No	No	No	No
Derrycrag Wood N.R.	No	No	No	No	No	No
Pollnaknockaun Wood N.R.	No	No	No	No	No	No
Cloonmoylan Bog	No	Yes	No	No	No	Yes
Barroughter Bog	No	Yes	No	No	No	Yes
Lough Derg, North East Shore	Yes	Yes	No	No	Yes	Yes
Ardgraigue Bog	No	No	No	No	No	No
Redwood Bog	No	Yes	No	No	No	Yes
All Saints Bog and Esker	No	Yes	No	No	No	Yes
Ballyduff/Clonfinane Bog	No	No	No	No	No	No
Kilcarren-Firville Bog	No	Yes	No	No	No	Yes
Liskeenan Fen	No	Yes	No	No	No	Yes

Table 3.29 Option H Desalination: SAC Sites

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts to habitats**	**Toxic contamination/ pollution**	**Non-toxic contamination**	**Disturbance to protected species listed on Annex I of Birds Directive**	**AA required (Y or N)**
Boyne Coast and Estuary	No	Yes	No	Yes	No	Yes
Rogerstown Estuary	No	Yes	No	Yes	No	Yes
Lambay island	No	Yes	No	Yes	Yes	Yes
Malahide Estuary	No	Yes	No	Yes	No	Yes
Baldoyle Bay	No	Yes	No	Yes	No	Yes
Ireland's Eye	No	Yes	No	Yes	No	Yes

3.8.2.2 Special Area of Conservation - Summary

Table 3.30 provides a summary of the SAC sites that have been screened in **Tables 3.21 to 3.29.** These sites will be further assessed in the appropriate assessment.

Table 3.30 Summary of SAC Sites Screened for Appropriate Assessment

Site ID	Site	A	B	C	D	E	F1	F2	G	H
8	Lough Funshinagh	√	X	X	√	√	X	X	√	X
11	Lough Ree	√	√	√	√	√	√	√	√	X
12	Corbo Bog	√	X	X	√	√	X	X	√	X
13	Fortwilliam Turlough	√	X	X	√	√	X	X	√	X
14	River Shannon Callows	√	√	√	√	√	√	√	√	X
15	Fin Lough (Offaly)	√	√	√	√	√	√	√	√	X
16	Mongan Bog	√	√	X	√	√	√	√	√	X
23	Lough Forbes Complex	√	√	√	√	√	√	√	√	X
38	Raheenmore Bog	X	X	X	X	√	√	X	X	X
51	Boyne Coast and Estuary	X	X	X	X	X	X	X	X	√
52	Rogerstown Estuary	X	X	X	X	X	X	X	X	√
53	Lambay Island	X	X	X	X	X	X	X	X	√
54	Malahide Estuary	X	X	X	X	X	X	X	X	√
55	Baldoyle Bay	X	X	X	X	X	X	X	X	√
56	Ireland's Eye	X	X	X	X	X	X	X	X	√
63	Glenasmole Valley	X	X	X	X	X	X	X	√	X
64	Wicklow Mountains	X	X	X	X	X	X	X	√	X
65	Lower River Shannon	√	√	√	√	√	√	√	√	X
78	Cloonmoylan Bog	√	√	X	√	√	√	√	√	X
79	Barroughter Bog	√	√	X	√	√	√	√	√	X
80	Lough Derg, North East Shore	√	√	√	√	√	√	√	√	X
82	Redwood Bog	√	√	X	√	√	√	√	√	X
83	All Saints Bog and Esker	√	√	X	√	√	√	√	√	X
86	Kilcarren-Firville Bog	√	√	X	√	√	√	√	√	X
87	Liskeenan Fen	√	√	X	√	√	√	√	√	X
101	River Barrow and River Nore	X	X	X	X	X	X	√	X	X

3.8.2.3 Screening Special Protection Areas

Table 3.31 to **Table 3.40,** provide details on the final screening phase for SPAs within Stage 1.

Table 3.31 Option A Lough Ree: SPA Sites

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts to habitats - hydrological impacts**	**Toxic contamination/ pollution**	**Non-toxic contamination**	**Disturbance to protected species listed on Annex I of Birds Directive**	**AA required (Y or N)**
River Suck Callows	No	Yes	No	No	No	Yes
Middle Shannon Callows	No	Yes	No	No	No	Yes
Lough Derg (Shannon)	No	Yes	No	No	No	Yes
Lough Ree	Yes	Yes	No	No	Yes	Yes
Mongan Bog	No	Yes	No	No	No	Yes
River Little Brosna Callows	No	Yes	No	No	No	Yes
All Saints Bog	No	Yes	No	No	No	Yes
River Shannon and River Fergus Estuaries	No	Yes	No	No	No	Yes

Table 3.32 Option B Lough Derg: SPA Sites

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts to habitats- hydrological impacts**	**Toxic contamination/ pollution**	**Non-toxic contamination**	**Disturbance to protected species listed on Annex I of Birds Directive**	**AA required (Y or N)**
River Suck Callows	No	Yes	No	No	No	Yes
Middle Shannon Callows	No	Yes	No	No	No	Yes
Lough Derg (Shannon)	Yes	Yes	No	No	Yes	Yes
Lough Ree	No	Yes	No	No	No	Yes
Mongan Bog	No	Yes	No	No	No	Yes
River Little Brosna Callows	No	Yes	No	No	No	Yes
All Saints Bog	No	Yes	No	No	No	Yes
River Shannon and River Fergus Estuaries	No	Yes	No	No	No	Yes

Table 3.33 Option C Parteen Basin: SPA Sites

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts to habitats- hydrological impacts**	**Toxic contamination/ pollution**	**Non-toxic contamination**	**Disturbance to protected species listed on Annex I of Birds Directive**	**AA required (Y or N)**
River Suck Callows	No	Yes	No	No	No	Yes
Middle Shannon Callows	No	Yes	No	No	No	Yes
Lough Derg (Shannon)	No	Yes	No	No	No	Yes
Lough Ree	No	Yes	No	No	No	Yes
River Little Brosna Callows	No	Yes	No	No	No	Yes
River Shannon and River Fergus Estuaries	No	Yes	No	No	No	Yes

Table 3.34 Option D Lough Ree and Lough Derg: SPA Sites

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts to habitats- hydrological impacts**	**Toxic contamination/ pollution**	**Non-toxic contamination**	**Disturbance to protected species listed on Annex I of Birds Directive**	**AA required (Y or N)**
River Suck callows	No	Yes	No	No	No	Yes
Middle Shannon Callows	No	Yes	No	No	No	Yes
Lough Derg (Shannon)	Yes	Yes	No	No	Yes	Yes
Lough Ree	Yes	Yes	No	No	Yes	Yes
Mongan Bog	No	Yes	No	No	No	Yes
River Little Brosna Callows	No	Yes	No	No	No	Yes
All Saints Bog	No	Yes	No	No	No	Yes
River Shannon and River Fergus Estuaries	No	Yes	No	No	No	Yes

Table 3.35 Option E Lough Ree and Storage: SPA Sites

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts to habitats- hydrological impacts**	**Toxic contamination/ pollution**	**Non-toxic contamination**	**Disturbance to protected species listed on Annex I of Birds Directive**	**AA required (Y or N)**
River Suck Callows	No	Yes	No	No	No	Yes
Middle Shannon Callows	No	Yes	No	No	No	Yes
Lough Derg (Shannon)	No	Yes	No	No	No	Yes
Lough Ree	Yes	Yes	No	No	Yes	Yes
Mongan Bog	No	Yes	No	No	No	Yes
River Little Brosna Callows	No	Yes	No	No	No	Yes
All Saints Bog	No	Yes	No	No	No	Yes
River Shannon and River Fergus Estuaries	No	Yes	No	No	No	Yes

Table 3.36 Option F1 Lough Derg and Storage: SPA Sites

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts to habitats- hydrological impacts**	**Toxic contamination/ pollution**	**Non-toxic contamination**	**Disturbance to protected species listed on Annex I of Birds Directive**	**AA required (Y or N)**
River Suck callows	No	Yes	No	No	No	Yes
Middle Shannon Callows	No	Yes	No	No	No	Yes
Lough Derg (Shannon)	Yes	Yes	No	No	Yes	Yes
Lough Ree	No	Yes	No	No	No	Yes
Mongan Bog SPA	No	Yes	No	No	No	Yes
River Little Brosna Callows	No	Yes	No	No	No	Yes
All Saints Bog	No	Yes	No	No	No	Yes
River Shannon and River Fergus Estuaries	No	Yes	No	No	No	Yes

Table 3.37 Option F2 Lough Derg and Storage: SPA Sites

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts to habitats- hydrological impacts**	**Toxic contamination/ pollution**	**Non-toxic contamination**	**Disturbance to protected species listed on Annex I of Birds Directive**	**AA required (Y or N)**
River Suck callows	No	Yes	No	No	No	Yes
Middle Shannon Callows	No	Yes	No	No	No	Yes
Lough Derg (Shannon)	Yes	Yes	No	No	Yes	Yes
Lough Ree	No	Yes	No	No	No	Yes
Mongan Bog SPA	No	Yes	No	No	No	Yes
River Little Brosna Callows	No	Yes	No	No	No	Yes
All Saints Bog	No	Yes	No	No	No	Yes
River Shannon and River Fergus Estuaries	No	Yes	No	No	No	Yes

Table 3.38 Option G Lough Derg/ Ree and Impoundment: Impacts on SPA Sites

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts to habitats- hydrological impacts**	**Toxic contamination/ pollution**	**Non-toxic contamination**	**Disturbance to protected species listed on Annex I of Birds Directive**	**AA required (Y or N)**
River Suck callows	No	Yes	No	No	No	Yes
Middle Shannon Callows	No	Yes	No	No	No	Yes
Lough Derg (Shannon)	Yes	Yes	No	No	Yes	Yes
Lough Ree	Yes	Yes	No	No	Yes	Yes
Mongan Bog	No	Yes	No	No	No	Yes
River Little Brosna Callows	No	Yes	No	No	No	Yes
All Saints Bog	No	Yes	No	No	No	Yes
River Shannon and River Fergus Estuaries	No	Yes	No	No	No	Yes
Poulaphouca Reservoir	No	Yes	No	No	No	Yes
Wicklow mountains	Yes	Yes	No	No	Yes	Yes

Table 3.39 Option H Desalination: SPA Sites

Is there potential for:						
Site name	**Direct habitat loss**	**Indirect impacts**	**Toxic contamination/ pollution**	**Non-toxic contamination**	**Disturbance to protected species listed on Annex I of Birds Directive**	**AA required (Y or N)**
Boyne Estuary	No	No	No	No	No	No
River Nanny Estuary and Shore	No	No	No	No	No	No
Rockabill	No	Yes	No	Yes	No	Yes
Skerries Islands	No	Yes	No	Yes	No	Yes
Rogerstown Estuary	No	Yes	No	Yes	No	Yes
Lambay Island	No	Yes	No	Yes	No	Yes
Broadmeadow/Swords Estuary	No	No	No	No	No	No
Baldoyle Bay	No	No	No	No	No	No
Irelands Eye	No	No	No	No	No	No
Howth Head Coast	No	No	No	No	No	No
North Bull Island	No	No	No	No	No	No
Sandymount Strand/Tolka Estuary	No	No	No	No	No	No

3.8.2.4 Special Protection Areas - Summary

Table 3.40 provides a summary of the SPA sites that have been screened in **Tables 3.31 to 3.39.** These sites will be further assessed in the appropriate assessment.

Table 3.40 Summary of SPA

Site ID		A	B	C	D	E	F1	F2	G	H
1	River Suck Callows	√	√	√	√	√	√	√	√	X
2	Middle Shannon Callows	√	√	√	√	√	√	√	√	X
3	Lough Ree	√	√	√	√	√	√	√	√	X
4	Mongan Bog	√	√	X	√	√	√	√	√	X
19	Rockabill	X	X	X	X	X	X	X	X	√
20	Skerries Islands	X	X	X	X	X	X	X	X	√
21	Rogerstown Estuary	X	X	X	X	X	X	X	X	√
22	Lambay Island	X	X	X	X	X	X	X	X	√

Site ID		A	B	C	D	E	F1	F2	G	H
29	River Shannon and River Fergus Estuaries	√	√	√	√	√	√	√	√	X
31	Lough Derg (Shannon)	√	√	√	√	√	√	√	√	X
33	River Little Brosna Callows	√	√	√	√	√	√	√	√	X
34	All Saints Bog	√	√	X	√	√	√	√	√	X
37	Poulaphouca Reservoir	X	X	X	X	X	X	X	√	X
38	Wicklow Mountains	X	X	X	X	X	X	X	√	X

3.9 STAGE 1 - CONCLUSION TABLE

The following tables (**Table 3.41** and **Table 3.42**) shown in **Figures 3.13-3.17** identify both the SAC and SPA sites that have been screened as having a potential for a likely significant impact from one or a combination of the draft Plan options in conjunction with other plans and projects.

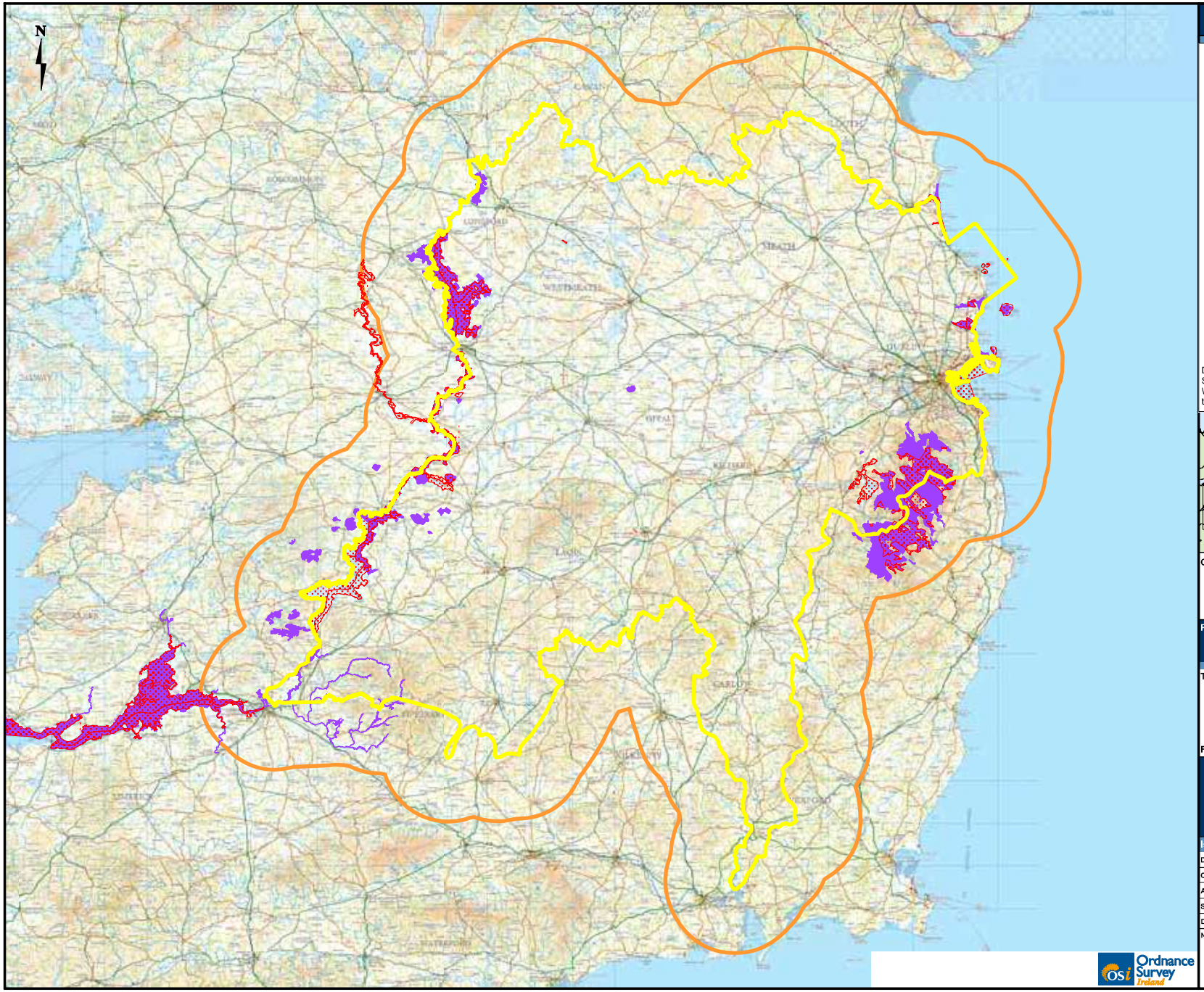
Table 3.41 Summary Table of Screening (SAC) – STAGE 1 HDA

Special Areas of Conservation										
Site ID	**Site**	**A**	**B**	**C**	**D**	**E**	**F1**	**F2**	**G**	**H**
8	Lough Funshinagh	√	X	X	√	√	X	X	√	X
11	Lough Ree	√	√	√	√	√	√	√	√	X
12	Corbo Bog	√	X	X	√	√	X	X	√	X
13	Fortwilliam Turlough	√	X	X	√	√	X	X	√	X
14	River Shannon Callows	√	√	√	√	√	√	√	√	X
15	Fin Lough (Offaly)	√	√	√	√	√	√	√	√	X
16	Mongan Bog	√	√	X	√	√	√	√	√	X
23	Lough Forbes Complex	√	√	√	√	√	√	√	√	X
38	Raheenmore Bog	X	X	X	X	√	√	X	X	X
51	Boyne Coast and Estuary	X	X	X	X	X	X	X	X	√
52	Rogerstown Estuary	X	X	X	X	X	X	X	X	√
53	Lambay Island	X	X	X	X	X	X	X	X	√
54	Malahide Estuary	X	X	X	X	X	X	X	X	√
55	Baldoyle Bay	X	X	X	X	X	X	X	X	√
56	Ireland's Eye	X	X	X	X	X	X	X	X	√
63	Glenasmole Valley	X	X	X	X	X	X	X	√	X
64	Wicklow Mountains	X	X	X	X	X	X	X	√	X
65	Lower River Shannon	√	√	√	√	√	√	√	√	X
78	Cloonmoylan Bog	√	√	X	√	√	√	√	√	X

Special Areas of Conservation										
Site ID	**Site**	**A**	**B**	**C**	**D**	**E**	**F1**	**F2**	**G**	**H**
79	Barrougher Bog	√	√	X	√	√	√	√	√	X
80	Lough Derg, North East Shore	√	√	√	√	√	√	√	√	X
82	Redwood Bog	√	√	X	√	√	√	√	√	X
83	All Saints Bog and Esker	√	√	X	√	√	√	√	√	X
85	Ballyduff/ Clonfinane Bog	X	X	X	X	X	X	X	X	X
86	Kilcarren-Firville Bog	√	√	X	√	√	√	√	√	X
87	Liskeenan Fen	√	√	X	√	√	√	√	√	X
101	River Barrow and River Nore	X	X	X	X	X	X	√	X	X

Table 3.42 Summary Table of Screening (SPA) – STAGE 1 HDA

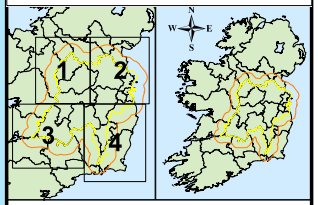
Special Protection Areas										
Site ID		**A**	**B**	**C**	**D**	**E**	**F1**	**F2**	**G**	**H**
1	River Suck Callows	√	√	√	√	√	√	√	√	X
2	Middle Shannon Callows	√	√	√	√	√	√	√	√	X
3	Lough Ree	√	√	√	√	√	√	√	√	X
4	Mongan Bog	√	√	√	√	√	√	√	√	X
19	Rockabill	X	X	X	X	X	X	X	X	√
20	Skerries Islands	X	X	X	X	X	X	X	X	√
21	Rogerstown Estuary	X	X	X	X	X	X	X	X	√
22	Lambay Island	X	X	X	X	X	X	X	X	√
29	River Shannon and River Fergus Estuaries	√	√	√	√	√	√	√	√	X
31	Lough Derg (Shannon)	√	√	√	√	√	√	√	√	X
33	River Little Brosna Callows	√	√	√	√	√	√	√	√	X
34	All Saints Bog	√	√	X	√	√	√	√	√	X
37	Poulaphouca Reservoir	X	X	X	X	X	X	X	√	X
38	Wicklow Mountains	X	X	X	X	X	X	X	√	X



Legend

- Study Area
- 15km Buffer
- SACs
- SPAs

Data Source:
SAC & SPA data downloaded from National Parks and Wildlife Services website (www.npws.ie). The data on the website was last updated on 28th May 2008



Client
Dublin City Council
Comhairle Cathrach Bhaile Átha Cliath

Project
Water Supply Project - Dublin Region

Title
SAC & SPA (Overview Map)

Figure **3.13**

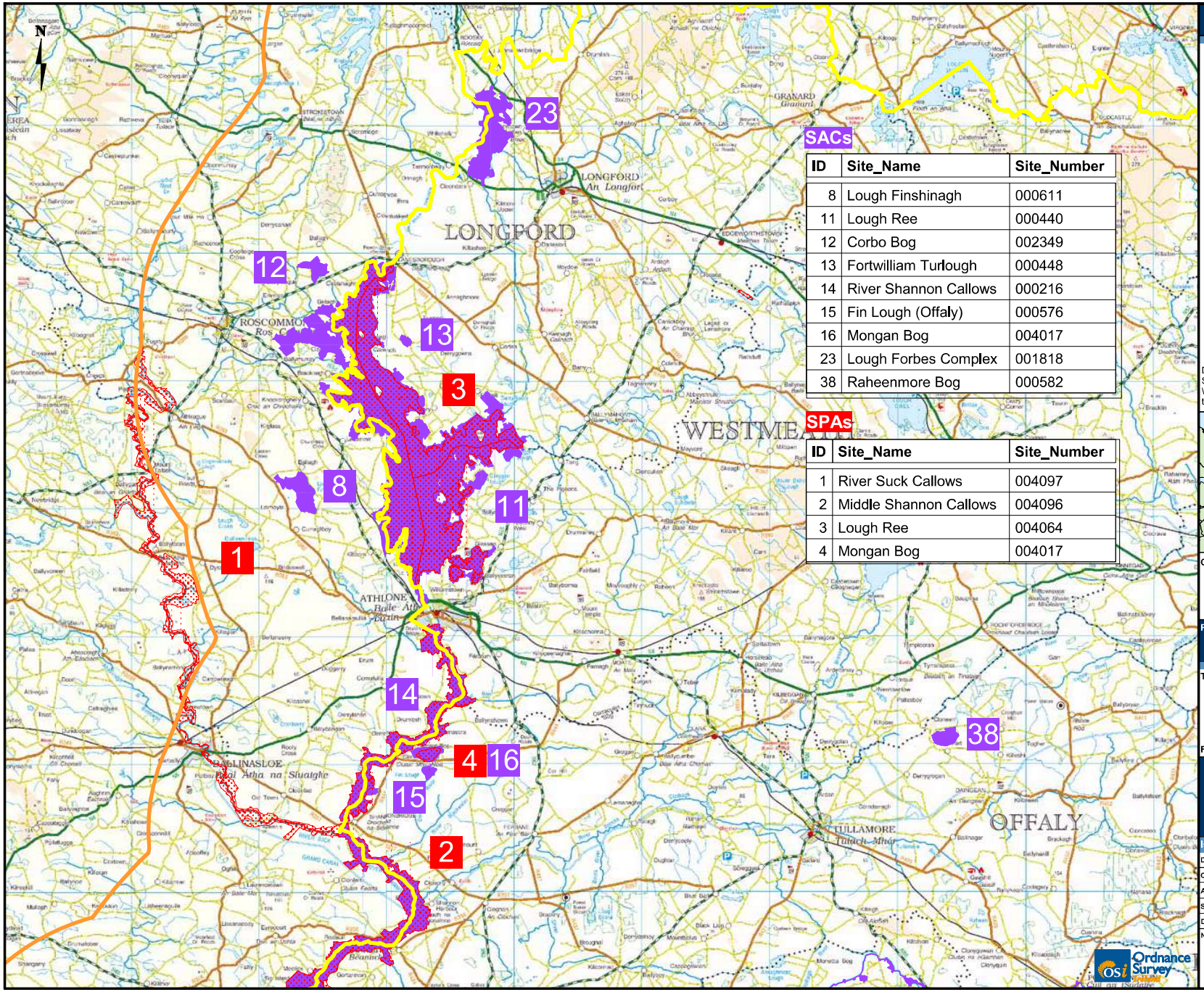
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Issue Details

Drawn by:	E. Finnerty	Project No.	MDE0599
Checked by:	S. Khan	File Ref.	MDE0599Mi0024F01
Approved by:	E. Oliviera		
Scale:	1:1,200,000 @ A4	Drawing No.	Rev.
Date:	07/10/08	Mi0024	F01

Notes
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Ordnance Survey Ireland



SACs

ID	Site_Name	Site_Number
8	Lough Finshinagh	000611
11	Lough Ree	000440
12	Corbo Bog	002349
13	Fortwilliam Turlough	000448
14	River Shannon Callows	000216
15	Fin Lough (Offaly)	000576
16	Mongan Bog	004017
23	Lough Forbes Complex	001818
38	Raheenmore Bog	000582

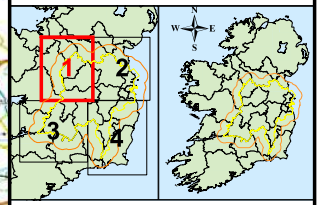
SPAs

ID	Site_Name	Site_Number
1	River Suck Callows	004097
2	Middle Shannon Callows	004096
3	Lough Ree	004064
4	Mongan Bog	004017

Legend

- Plan Area
- 15km Buffer
- SACs
- SPAs

Data Source:
SAC & SPA data downloaded from National Parks and Wildlife Services website (www.npws.ie). The data on the website was last updated on 28th May 2008



Client
Dublin City Council
Comhairle Cathrach Bhaile Átha Cliath

Project
Water Supply Project - Dublin Region

Title
SAC & SPA (1 of 4)

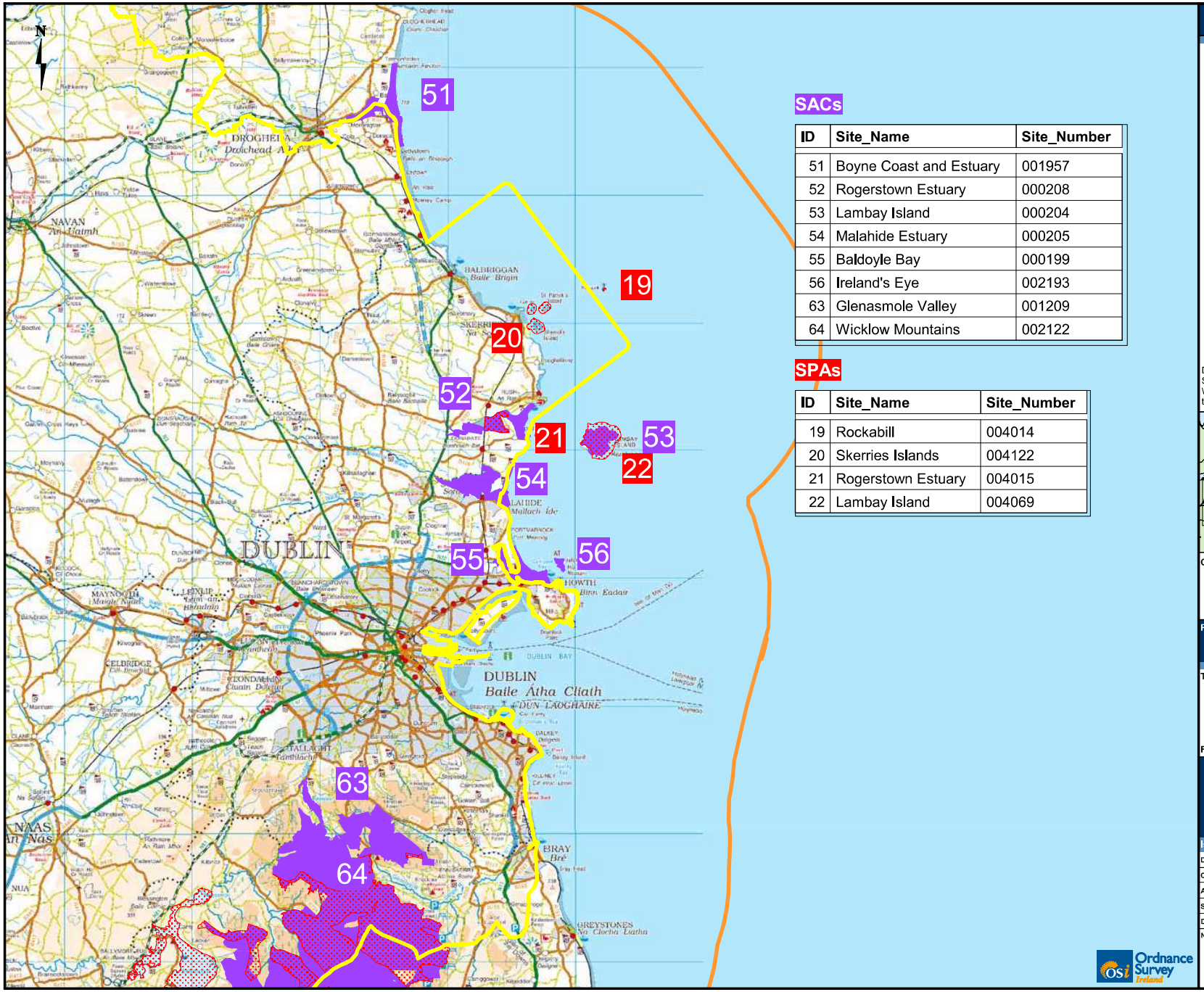
Figure **3.14**

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SACs

ID	Site_Name	Site_Number
51	Boyne Coast and Estuary	001957
52	Rogerstown Estuary	000208
53	Lambay Island	000204
54	Malahide Estuary	000205
55	Baldoyle Bay	000199
56	Ireland's Eye	002193
63	Glenasmole Valley	001209
64	Wicklow Mountains	002122

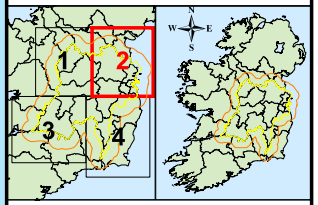
SPAs

ID	Site_Name	Site_Number
19	Rockabill	004014
20	Skerries Islands	004122
21	Rogerstown Estuary	004015
22	Lambay Island	004069

Legend

- Plan Area
- 15km Buffer
- SACs
- SPAs

Data Source:
SAC & SPA data downloaded from National Parks and Wildlife Services website (www.npws.ie). The data on the website was last updated on 28th May 2008



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Comhairle Cathrach Bhaile Átha Cliath

Project
Water Supply Project - Dublin Region

Title
SAC & SPA (2 of 4)

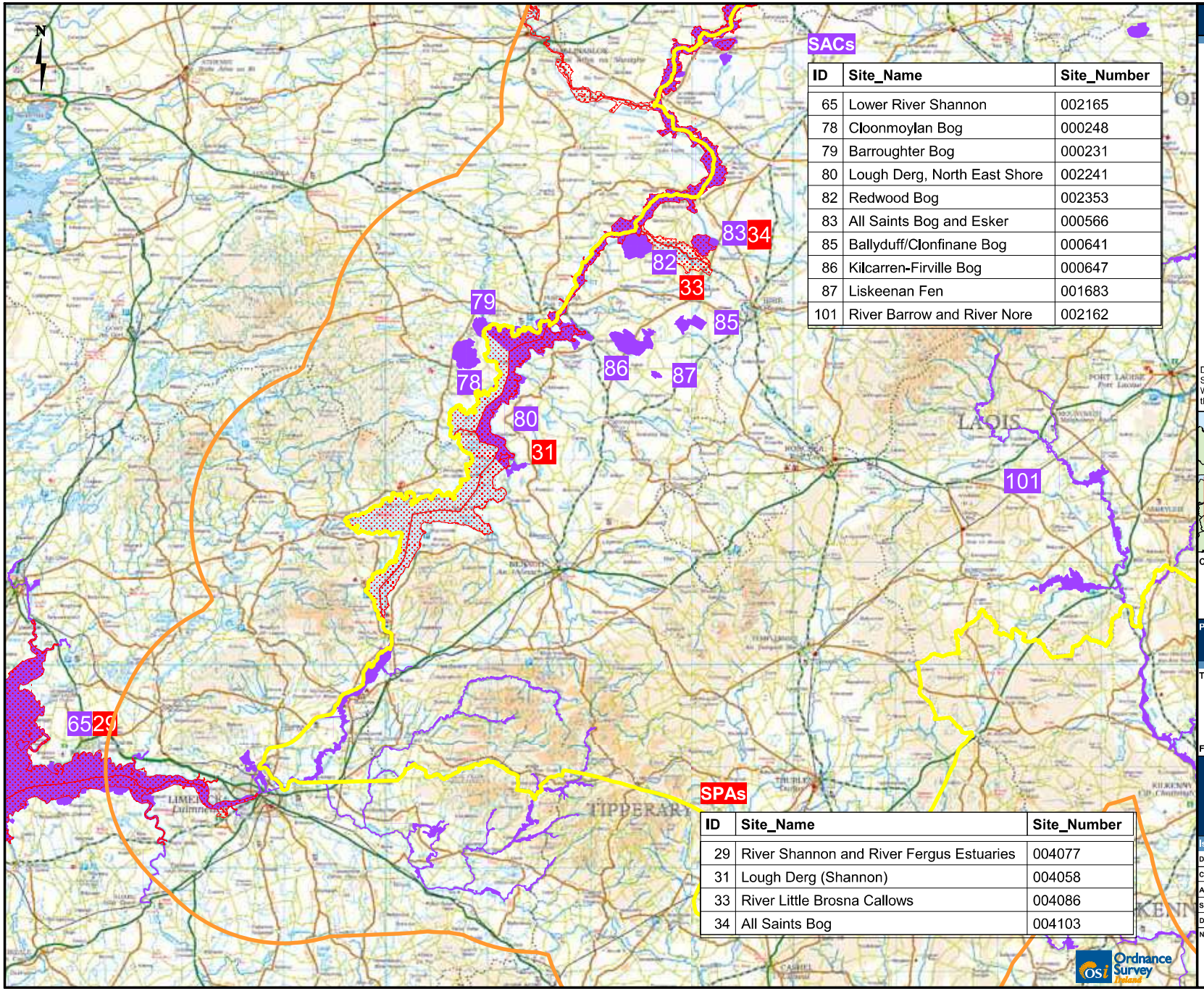
Figure **3.15**

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SACs

ID	Site_Name	Site_Number
65	Lower River Shannon	002165
78	Cloonmoylan Bog	000248
79	Barroughter Bog	000231
80	Lough Derg, North East Shore	002241
82	Redwood Bog	002353
83	All Saints Bog and Esker	000566
85	Ballyduff/Clonfinane Bog	000641
86	Kilcarren-Firville Bog	000647
87	Liskeenan Fen	001683
101	River Barrow and River Nore	002162

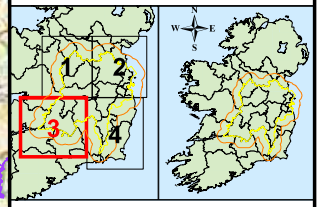
SPAs

ID	Site_Name	Site_Number
29	River Shannon and River Fergus Estuaries	004077
31	Lough Derg (Shannon)	004058
33	River Little Brosna Callows	004086
34	All Saints Bog	004103

Legend

- Plan Area
- 15km Buffer
- SACs
- SPAs

Data Source:
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Client
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Comhairle Cathrach Bhaile Átha Cliath

Project
Water Supply Project - Dublin Region

Title
SAC & SPA (3 of 4)

Figure **3.16**

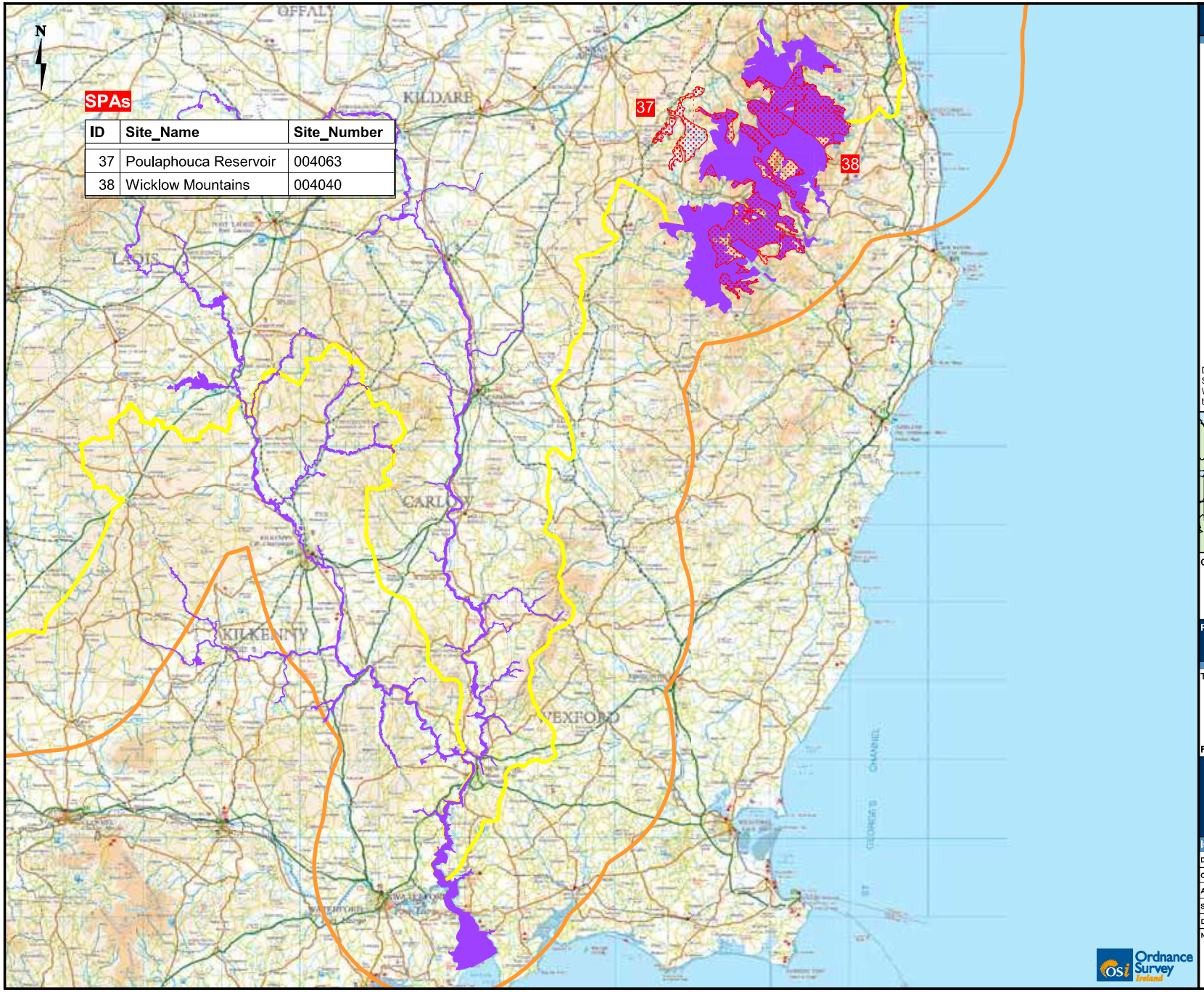
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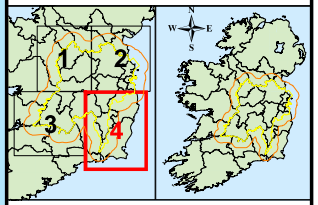
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Legend

- Plan Area
- 15km Buffer
- SACs
- SPAs

Data Source:
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Client: Dublin City Council
Comhairle Cathrach Bhaile Átha Cliath

Project: *Water Supply Project - Dublin Region*

Title: **SAC & SPA (4 of 4)**

Figure: **3.17**

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4 STAGE 2 – APPROPRIATE ASSESSMENT

4.1 INTRODUCTION

The objective of this 'Appropriate Assessment' stage is to determine whether the draft Plan (either alone or in combination with other plans, programmes and projects) would result in significant adverse impacts to the integrity of a site with respect to the site's structure, function and/or conservation objectives. This appropriate assessment will be undertaken for the European sites likely to be significantly affected by the technically feasible options to supply water to the Dublin Region.

Section 3 - Screening has created a list of sites (**Table 3.41** and **Table 3.42**) with the potential to be significantly affected by implementation of the draft Plan. As such, an appropriate assessment will be undertaken for each of these identified sites. It involves analysing the likely adverse effects of the draft Plan on each of the Special Area of Conservation and Special Protection Area sites in greater detail. The potential adverse effects considered at this stage will either be effects occurring as a result of the implementation of the draft Plan alone or in-combination with other plans, programmes and/or projects.

4.2 METHODOLOGY

The methodology follows a similar outline to that previously identified in Screening, **Section 3** but a more detailed assessment in undertaken for this stage and involves detailed analysis of the draft Plan and the modelling results. The appropriate assessment will involve the following steps:

- A list of the SAC and SPA sites identified during Screening where the potential for a likely significant effect resulting from implementation of the draft Plan could not be eliminated;
- Determination of the qualifying feature and conservation objectives of the SAC and SPA sites;
- Determination of the sensitivity of the qualifying feature; and
- An appropriate assessment in combination with other plans/ programmes/ projects which will consider the characteristics of the draft Plan options and their potential significant adverse effects on the integrity of the European sites.

4.3 SIGNIFICANT EFFECT

This is a procedural provision, which requires an appropriate assessment of the plan in the event that it is likely to have a significant effect on the SAC or SPA alone or in combination with other plans or projects. The question of whether such is likely to have a significant effect only triggers the

requirement for the appropriate assessment and does not govern the decision making process as to the question of any adverse effect on the integrity of the SAC or SPA.

4.4 ADVERSE EFFECT

This is the second step in the process that approval of the draft Plan may only be given if it has been ascertained that it will not adversely affect the integrity of the SAC or SPA. The decision will be informed by the contents of the Habitats Directive Assessment. This HDA is based upon the information available at the time.

Site Integrity can be defined as '*the coherence of the sites ecological structure and function across its whole area or the habitats, complex of habitats and/or populations of species for which the site is or will be classified*' (MN, 2000).

4.5 CONSERVATION OBJECTIVES

4.5.1 Special Areas of Conservation

This section provides details on the conservation objectives for the SACs, which has been taken from existing management plans.

- To maintain, and where possible, enhance the Annex I habitats for which the cSAC has been selected at favourable conservation status.
- To maintain the Annex II species for which the cSAC has been selected at favourable conservation status.
- To maintain, and where possible enhance, the extent, biodiversity and species richness of the site.
- To maintain other habitats at favourable conservation status.
- To establish effective liaison and co-operation with landowners, legal users and relevant Authorities.

In addition the EPA's Water Framework Directive Water Status contains identification and ranking of nature conservation designated areas. It includes hydrological variables in relation to water quality and quantity.

4.5.2 Screened in Special Areas of Conservation

The following table outlines all of the SACs that have been screened as potentially being affected by the draft Plan. There are four sites, Fin Lough (Offaly), Mongan Bog, Raheenmore Bog and Kilcarren-Firville Bog that have a Management Plan and detailed Conservation Objectives.

Table 4.1 Conservation Objectives of the SAC Sites

Site ID	European Site	Mgt Plan	Conservation Objectives
8	Lough Funshinaggh	No	See 4.5.1
11	Lough Ree	No	See 4.5.1
12	Corbo Bog	No	See 4.5.1
13	Fortwilliam Turlough	No	See 4.5.1
14	River Shannon Callows	No	See 4.5.1
15	Fin Lough (Offaly)	Yes	Objective 1: To maintain the Annex I habitats for which the cSAC has been selected at favourable conservation status; alkaline fen and alkaline fen/calcareous springs mosaic (20% and 1% area of the site respectively). Objective 2: To maintain the Annex II species for which the cSAC has been selected at favourable conservation status; Vertigo geyeri and other notable fauna species. Objective 3: To maintain the extent, biodiversity and species and richness of the site. Objective 4: To establish effective liaison and co-operation with landowners, legal users and relevant authorities.
16	Mongan Bog	Yes	Objective 1: To maintain and where possible, enhance the ecological value of active raised bog (60% of the site). Objective 2: To maintain and increase where possible, populations of notable bird species, particularly those listed in Annex I of the E.U. Birds Directive - Greenland white-fronted goose, hen harrier, merlin, peregrine falcon, corncrake and short-eared Owl. Objective 3: To maintain and enhance where possible the conservation value of other habitats particularly cutover bog (17%), lowland wet and lowland dry grasslands (6%) and woodlands (1%). Objective 4: Support the provision of interpretative material for educational, research and recreational use. Objective 5: Initiate and continue effective liaison and co-operation with landowners/managers and relevant interest groups.
23	Lough Forbes Complex	No	See 4.5.1
38	Raheenmore Bog	Yes	Objective 1: To maintain and, where possible, enhance the quality of the active raised bog (64% of the site). Objective 2: To restore areas of lagg vegetation around the raised bog i.e. in the westnorth-west and south of the site. Objective 3: To maintain and, where possible, enhance the ecological quality of other habitats, in particular dry, broadleaved semi-natural woodland (3% of site), cutover bog (10%), lowland wet grassland (23%), and freshwater marsh (<1%).

Site ID	European Site	Mgt Plan	Conservation Objectives
			Objective 4: To maintain, and possibly increase, the populations of Annex I and other important species of flora and fauna present e.g. merlin, grouse and *Sphagnum pulchrum*. Objective 5: To maintain effective liaison between NPW, landowners and other interested parties, in order to effectively manage the site for conservation.
51	Boyne Coast and Estuary	No	See 4.5.1
52	Rogerstown Estuary	No	See 4.5.1
53	Lambay Island	No	See 4.5.1
54	Malahide Estuary	No	See 4.5.1
55	Baldoyle Bay	No	See 4.5.1
56	Ireland's Eye	No	See 4.5.1
63	Glenasmole Valley	No	See 4.5.1
64	Wicklow Mountains	No	See 4.5.1
65	Lower River Shannon	No	See 4.5.1
78	Cloonmoylan Bog	No	See 4.5.1
79	Barrougher Bog	No	See 4.5.1
80	Lough Derg, North East Shore	No	See 4.5.1
82	Redwood Bog	No	See 4.5.1
83	All Saints Bog and Esker	No	See 4.5.1
86	Kilcarren-Firville Bog	Yes	Objective 1: To maintain and enhance where possible the area of active raised bog (approx. 70% of the site). Objective 2: To restore areas of infiltration lagg. Objective 3: To maintain and where possible, enhance the ecological condition of other habitats: cutover bog (8%), lake system (2%), lowland wet grassland (6%), broadleaved woodland and scrub (3%). Objective 4: To maintain and where possible increase the populations of Annexed and other notable species particularly Greenland white-fronted goose, whooper swan, red grouse and alder buckthorn. Objective 5: To provide infrastructure for public access. Objective 6: To initiate and continue effective liaison with landowners/managers and relevant interest groups.
87	Liskeenan Fen	No	See 4.5.1
101	River Nore and River Barrow	No	See 4.5.1

Table 4.2 Conservation Objectives of the SPA Sites

Site ID	European Site	Mgt Plan	Conservation Objectives
1	River Suck Callows	No	Not available
2	Middle Shannon Callows	No	Not available
3	Lough Ree	No	Not available
4	Mongan Bog	Yes	Objective 1: To maintain and where possible, enhance the ecological value of *active raised bog (60% of the site). Objective 2: To maintain and increase where possible, populations of notable bird species, particularly those listed in Annex I of the E.U. Birds Directive - Greenland white-fronted goose, hen harrier, merlin, peregrine falcon, corncrake and short-eared owl. Objective 3: To maintain and enhance where possible the conservation value of other habitats particularly cutover bog (17%), lowland wet and lowland dry grasslands (6%) and woodlands (1%). Objective 4: Support the provision of interpretative material for educational, research and recreational use. Objective 5: Initiate and continue effective liaison and co-operation with landowners/managers and relevant interest groups.
19	Rockabill	No	Not available
20	Skerries Islands	No	Not available
21	Rogerstown Estuary	No	Not available
22	Lambay Island	No	Not available
29	River Shannon and River Fergus Estuaries	No	Not available
31	Lough Derg (Shannon)	No	Not available
33	River Little Brosna Callows	No	Not available
34	All Saints Bog	No	Not available
37	Poulaphouca Reservoir	No	Not available
38	Wicklow Mountains	No	Not available

4.6 SENSITIVITY OF QUALIFYING FEATURE

4.6.1 Introduction

The following habitat sensitivities are based on the Natura 2000 Screening Protocol – Water Services Plans and Projects issued by the National Parks and Wildlife Service and the ecological experience by Natura Environmental Consultants and Ecological Consultancy Services.

4.6.1.1 Special Areas of Conservation

Table 4.3 Sensitivity of the Qualifying Feature (SAC Sites)

Qualifying Interest (Annex I & Annex II)	Sensitivity of the Qualifying Feature(s)	Applicable European Site	Site ID
Natural Euthrophic lakes with Magnopotamion or Hydrocharition-type vegetation	Surface and groundwater dependant	Lough Ree	11
	Highly sensitive to hydrological changes	Lough Forbes Complex	23
	Highly sensitive to pollution		
Alkaline fens	Groundwater dependant	Fin Lough	15
	Highly sensitive to hydrological changes	Lough Derg, East Shore	80
	Changes in nutrient or base status	River Boyne and River Blackwater	39
		Lough Ree	11
Old sessile oak woods with Ilex and Blechnum in British Isles	Changes in management	Lough Ree	11
	Changes in nutrient or base status	Lough Forbes Complex	23
		Wicklow Mountains	64
		River Boyne and River Blackwater	39
Semi-natural dry grassland and scrubland facies on calcareous substrates (Festuco Brometalia) (*important orchid sites)*	Changes in management	Lough Ree	11
	Changes in nutrient or base status	Glenasmole Valley	63
	Moderately sensitive to hydrological change	All Saints Bog and Esker	83
Bog woodland*	Surface and groundwater dependent	Lough Ree	11

Qualifying Interest (Annex I & Annex II)	Sensitivity of the Qualifying Feature(s)	Applicable European Site	Site ID
	Highly sensitive to hydrological changes	All Saints Bog and Esker	83
	Inappropriate management	Ballyduff/Clonfinane Bog	85
		Cloonmoylan Bog	78
Limestone pavements*	Physical removal	Lough Ree	11
	Scrub encroachment	River Shannon Callows	14
		Lough Derg, North East Shore	80
Degraded raised bogs still capable of natural regeneration	Surface and groundwater dependent	Lough Ree	11
	Highly sensitive to hydrological changes	Fin Lough	15
	Inappropriate management	Lough Forbes Complex	23
		Cloonmoylan Bog	78
		Barrougher Bog	79
		Redwood Bog	82
		All Saints Bog and Esker	83
		Ballyduff/Clonfinane Bog	85
		Kilcarren/Firville Bog	86
		Mongan Bog	16
		Raheenmore Bog	38
Otter (*Lutra lutra)*	Surface and marine water dependent	Lough Ree	11
	Moderately sensitive to hydrological change	Lower River Shannon	65
Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis)*	Surface and groundwater dependent	Lough Ree	11
	Moderately sensitive to hydrological change	River Shannon Callows	14
	Changes in management		
	Changes in nutrient status		
Molinia meadows on calcareous, peaty or clavey-silt-laden soils (Molinion caeruleae)	Surface and groundwater dependent	River Shannon Callows	14
	Moderately sensitive to hydrological change	Glenasmole Valley	63
	Changes in management	Lower River Shannon	65

Qualifying Interest (Annex I & Annex II)	Sensitivity of the Qualifying Feature(s)	Applicable European Site	Site ID
	Changes in nutrient status		
Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*	Surface and groundwater dependent	River Shannon Callows	14
	Highly sensitive to hydrological changes	River Barrow and River Nore	101
	Changes in management	Lower River Shannon	65
		River Boyne and River Blackwater	39
		Lough Derg, East Shore	80
Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	Surface and groundwater dependent	Fin Lough	15
	Highly sensitive to hydrological changes		
	Highly sensitive to pollution		
Whorl snail (*Vertigo geyeri)*	Groundwater dependent	Fin Lough	15
	Highly sensitive to hydrological changes		
Active raised bogs*	Surface and groundwater dependent	Lough Forbes Complex	23
	Highly sensitive to hydrological changes	Cloonmoylan Bog	78
	Inappropriate management	Barrougher Bog	79
		Redwood Bog	82
		All Saints Bog and Esker	83
		Ballyduff/Clonfinane Bog	85
		Kilcarren-Firville Bog	86
		Mongan Bog	16
		Raheenmore Bog	38
Depressions on peat substrates of the Rhynchosporion	Surface and groundwater dependent	Lough Forbes Complex	23
	Low sensitivity to hydrological changes	Cloonmoylan Bog	78
	Erosion, land-use changes	Barrougher Bog	79
		Redwood Bog	82
		All Saints Bog and Esker	83
		Ballyduff/Clonfinane Bog	85

Qualifying Interest (Annex I & Annex II)	Sensitivity of the Qualifying Feature(s)	Applicable European Site	Site ID
		Kilcarren/Firville Bog	86
		Mongan Bog	16
		Raheenmore Bog	38
Estuaries	Surface and marine water dependent	Lower River Shannon	65
	Medium sensitivity to hydrological change	Rogerstown Estuary	52
	Changes to salinity and tidal regime	River Barrow and River Nore	101
	Medium sensitivity to pollution		
	Coastal development		
Mudflats and sandflats not covered by seawater at low tide	Marine water dependent	Lower River Shannon	65
	Medium sensitivity to hydrological change	Rogerstown Estuary	52
	Changes to salinity and tidal regime	River Barrow and River Nore	101
	Aquaculture, coastal protection and land reclamation	Malahide Estuary	54
		Baldoyle Bay	55
Coastal lagoons*	Surface, ground and marine water dependent	Lower River Shannon	65
	Highly sensitive to hydrological changes		
	Highly sensitive to pollution		
	Changes in salinity and tidal regime		
Vegetated sea cliffs of the Atlantic and Baltic coasts	Coastal development	Lower River Shannon	65
	Erosion, over-grazing and recreation	Lambay Island	53
		Ireland's Eye	56
Salicornia and other annuals colonizing mud and sand	Marine water dependent	Lower River Shannon	65
	Medium sensitivity to hydrological change	River Barrow and River Nore	101
	Changes in salinity and tidal regime	Rogerstown Estuary	52
	Infilling, reclamation, invasive species	Malahide Estuary	54
		Baldoyle Bay	55
Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	Marine and groundwater dependent	Lower River Shannon	65
	Medium sensitivity to hydrological change	Rogerstown Estuary	52
	Changes in salinity and tidal regime	Baldoyle Bay	55

Qualifying Interest (Annex I & Annex II)	Sensitivity of the Qualifying Feature(s)	Applicable European Site	Site ID
	Overgrazing, erosion and accretion	River Barrow and River Nore	101
		Malahide Estuary	54
Mediterranean salt meadows (Juncetalia maritimi)	Marine and groundwater dependent	Lower River Shannon	65
	Medium sensitivity to hydrological change	Rogerstown Estuary	52
	Changes in salinity and tidal regime	Malahide Estuary	54
	Coastal development and reclamation	Baldoyle Bay	55
		River Barrow and River Nore	101
Sandbanks which are slightly covered by seawater all the time	Marine water dependent	Lower River Shannon	65
	Low sensitivity to hydrological changes		
	Potential extractions, wind farm development, dredge disposal		
Large shallow inlets and bays	Surface and marine water dependent	Lower River Shannon	65
	Low sensitivity to hydrological changes		
	Aquaculture, fishing and pollution		
Perennial vegetation of stony banks,	Marine water dependent	Lower River Shannon	65
Reefs	Low sensitivity to hydrological changes	Ireland's Eye	56
	Coastal development, recreation and gravel removal		
Spartina swards (Spartinion maritimae)	Marine water dependent	Lower River Shannon	65
	Medium sensitivity to hydrological change	Rogerstown Estuary	52
	Considered an invasive species in Ireland	Malahide Estuary	54
		Baldoyle Bay	55
		River Barrow and River Nore	101
Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	Surface and groundwater dependent	Lower River Shannon	65
	Highly sensitive to hydrological changes	River Barrow and River Nore	101
	Highly sensitive to pollution		

Qualifying Interest (Annex I & Annex II)	Sensitivity of the Qualifying Feature(s)	Applicable European Site	Site ID
River lamprey *(Lampetra fluviatilis)*	Surface water dependent Highly sensitive to hydrological change	Lower River Shannon	65
Brook lamprey (*Lampetra planeri)*	Surface water dependent Highly sensitive to hydrological change	Lower River Shannon	65
Sea lamprey (*Petromyzon marinus)*	Surface and marine water dependent Highly sensitive to hydrological change	Lower River Shannon	65
Atlantic salmon (*Salmo salar)*	Surface and marine water dependent Highly sensitive to hydrological change	Lower River Shannon	65
Bottle-nose dolphin (*Tursiops truncatus)*	Marine water dependent Highly sensitive to hydrological change	Lower River Shannon	65
Freshwater pearl mussel *(Margaritifera margaritifera*)	Surface water dependent Highly sensitive to hydrological change Very highly sensitive to pollution	Lower River Shannon	65
Taxus baccata woods of the British Isles	Restricted distribution and limited suitable habitat Inappropriate management Invasion by aliens	Lough Derg, North East Shore	80
Juniperus communis formations on heaths or calcareous grasslands	Onset of inundation or waterlogging Inappropriate management	Lough Derg, East Shore	80
Calcareous fens with Cladium mariscus and species of the Carcion devallianae	Groundwater dependent Highly sensitive to hydrological changes Changes in nutrient or base status	Lough Derg, East Shore Liskeenan	80 87
Grey seal (*Halichoer grypus)*	Marine water dependent Sensitive to changes in food supply	Lambay Island	53

* Priority Habitat

4.6.1.2 Special Protection Areas

The following Table 4.4 is taken from a draft list of special conservation interest species (including selection species) for the SPAs listed below.

Table 4.4 Sensitivity of the Qualifying Feature (SPA Sites)

Natura 2000 Site	Selection Species	Other Species of Special Conservation Interest	Sensitivities for all species
River Suck callows SPA	Greenland White-Fronted Goose, Whooper Swan	Wigeon, Lapwing,	Loss of habitat or fragmentation Highly sensitive to hydrological changes Increased disturbance
Middle Shannon Callows SPA	Corncrake, Golden Plover, Lapwing, Black-tailed Godwit, Redshank, Whooper Swan.	20,000+ Wintering Waterfowl, Wigeon, Black-headed Gull,	Changes in management of agricultural grassland, Loss of habitat or fragmentation Highly sensitive to hydrological changes Increased disturbance
Lough Ree SPA	Teal, Mallard, Tufted Duck, Common Scoter, Goldeneye, Golden Plover, Lapwing, Common Tern	Whooper Swan , Wigeon, Shoveler, Coot	Loss of habitat or fragmentation Highly sensitive to hydrological changes Increased disturbance
Mongan Bog SPA	Traditional Greenland White-fronted Goose site		Loss of habitat or fragmentation Highly sensitive to hydrological changes

Natura 2000 Site	Selection Species	Other Species of Special Conservation Interest	Sensitivities for all species
River Shannon and River Fergus Estuaries SPA	Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank,20,000+ Wintering Waterfowl	Whooper swan, Pintail, Shoveler, Scaup, Black-headed Gull	Loss of habitat or fragmentation Highly sensitive to hydrological changes Increased disturbance
Lough Derg SPA	Cormorant, Tufted Duck Common Tern	Goldeneye	Lower water levels leading to potential abandonment of islands, Loss of habitat or fragmentation, Highly sensitive to hydrological changes Increased disturbance
River Little Brosna Callows SPA	Whooper Swan, Greenland White-fronted Goose,	Black -tailed Godwit, Wigeon, Teal, Pintail, Shoveler, Golden Plover, Lapwing,20,000+ Wintering Waterfowl	Loss of habitat or fragmentation, Highly sensitive to hydrological changes Increased disturbance
All Saints Bog SPA	Traditional Greenland White-fronted Goose site		Loss of habitat or fragmentation Highly sensitive to hydrological changes
Rockabill	Purple Sandpiper, Roseate Tern,	Artic Tern	Loss of habitat or fragmentation,

Natura 2000 Site	Selection Species	Other Species of Special Conservation Interest	Sensitivities for all species
	Common Tern		Highly sensitive to hydrological changes Increased disturbance
Skerries Islands SPA	Cormorant, Light-bellied Brent Goose, Purple Sandpiper, Turnstone, Herring Gull	Shag	Loss of habitat or fragmentation Highly sensitive to hydrological changes Increased disturbance
Rogerstown Estuary SPA	Light-bellied Brent Goose, Shelduck, Oystercatcher, Ringed Plover, Knot	Greylag Goose, Shoveler, Grey Plover, Dunlin, Black-tailed Godwit, Redshank	Loss of habitat or fragmentation Highly sensitive to hydrological changes Increased disturbance
Lambay Island SPA	Cormorant, Shag, Lesser Black-backed Gull, Herring Gull, Kittiwake, Guillmot, Razorbill, 20,000+ Wintering Waterfowl	Fulmar, Greylag Goose, Puffin, Black-headed Gull	Loss of habitat or fragmentation Highly sensitive to hydrological changes Increased disturbance
Poulaphouca Reservoir SPA	Greylag Goose	Lesser Black-backed Gull	Loss of habitat or fragmentation Highly sensitive to hydrological changes Increased disturbance
Wicklow Mountains SPA	Merlin, Peregrine Falcon		Loss of habitat or fragmentation

Natura 2000 Site	Selection Species	Other Species of Special Conservation Interest	Sensitivities for all species
			Increased disturbance

Member States are explicitly required under Article 4 of the Birds Directive to pay particular attention to wetlands. To this end, in the case of any selected SPA which is, or contains, a wetland, the 'Wetland & Waterbirds' are identified and listed as a special conservation interest for the site.Therefore 'Wetland & Waterbirds' is a special conservation interest for the following sites: River Suck Callows SPA, Middle Shannon Callows SPA, Lough Ree SPA, River Shannon and River Fergus Estuaries SPA, Lough Derg SPA, River Little Brosna Callows SPA, Rogerstown Estuary SPA.

4.7 RIVER SHANNON MODELLING

4.7.1 Introduction

A hydraulic and hydrological computer model of the Upper Shannon River Basin was constructed to evaluate the impact of water abstraction from Lough Ree/Lough Derg/Parteen Basin for the Dublin Region. The model enables the simulation of present meteorological conditions as well as future climate change scenarios. **Appendix B** of the draft Plan contains the modelling results.

4.7.2 Hydrological Modelling of the River Shannon

Flows and water levels in the Shannon result primarily from rainfall on the catchment area; consequently flows and water levels in Winter / Spring are generally higher than in Summer / Autumn. Downstream flows are higher than upstream on account of the increased catchment area contributing to the flows. Average flows at L. Derg are approx 180m^3/sec (cubic metres per second) compared to average flows at L. Ree of approx 100m^3/sec.

The Shannon's management and operational regime as set out in ESB's "Regulations & Guidelines for Control of the River Shannon" are an integral part of the modelling operation. The Shannon is managed by the Electricity Supply Board (ESB) and Waterways Ireland (WI) in accordance with these Regulations and Guidelines. The Regulations, which are reviewed regularly, have been in place since the early 1970's and they represent an operational best-fit for meeting various (competing) stakeholder interests on the Shannon, in particular; navigation, flooding, tourism, agriculture, power generation, water supply and fisheries.

In addition to modelling the ESB / WI operational regime, the model can also assess the impacts of abstractions on water residence times in lakes and can demonstrate how the operation of control structures (weirs, sluices and dams) can be optimised to facilitate abstractions thereby minimising potential abstraction impacts.

The model operates on Danish Hydraulic Institute, MIKE NAM and MIKE 11 suite of modelling software. This software is in widespread use worldwide for applications such as the modelling of proposed abstraction impacts on the Shannon River and lake system. Surveying data, operational data and records were obtained from OPW, ESB, Waterways Ireland and the Shannon River Basin Project, which enabled the model's development.

The modelling simulations concentrated on the statistically driest years over the recent period of record particularly 1989, 1995 and 2000. Most years can be modelled since good quality weather data is available from Met Eireann. For illustration purposes 1995 has been selected.

Two climate change scenarios (ICARUS and Met Eireann's C4i) were modelled for Options A, D and E using 1995 as the base year. Description of climate change assessment methodologies and modelling results are contained in Appendix B of the draft Plan. Options involving Lough Derg and Parteen Basin were not modelled for climate change since abstractions from these locations assume that power generation at Ardnacrusha is modified (1-2%) to compensate for abstraction impacts on water levels. Impacts resulting from climate change would also be compensated for in a similar manner through modifications to Ardnacrusha's operations. Compensating for abstraction and climate change in this manner enables operational lake levels in Lough Derg and Parteen Basin to be maintained as at present.

4.7.3 Regulations and Guidance for Control of River Shannon (Lough Ree)

The Shannon is managed and operated by ESB and Waterways Ireland in accordance with rules, which are set out in the "Regulations & Guidelines for Control of the River Shannon". The Regulations prescribe the lake levels (and indirectly the flows) that must be implemented and maintained in Lough Ree at different stages throughout the year. Typical details of regulation requirements/guidelines in respect of Lough Ree lake levels are illustrated in **Table 4.5**.

Table 4.5 Lough Ree Target / Minimum Operational Levels (ESB Regulations & Guidelines)

April – June Target Level	If > 35.10mODM* reduce to 34.95mODM
July – Mid August Target Level	If > 35.00mODM reduce to 34.85mODM by end August
Mid August – October Target Level	34.49mODM by Mid October
Min Operational Level 01 April – 15 August	34.79mODM
Min Operational Level 15 August – 15 Oct	34.49mODM
Min Operational Level 15 Oct – 31 March	34.18mODM
Minimum Navigation Level	34.18mODM
Athlone Weir Crest Level	34.70mODM
Downstream Level requiring Sluice Closure	33.42mODM
Minimum Downstream Flow Rate	$12m^3$/sec (maintained by sluice gate operation when lake level lower than 34.79mODM)

* All levels are in metres Ordinance Datum Malin (mODM)

The Regulations require that Lough Ree's lake levels are drawn down gradually from April to October in accordance with agreed target levels, which vary over the (7 month) period. The drawing down of lake levels is undertaken to ensure that the lake's storage capacity is optimised for flood management. Increasing the storage capacity of the lake provides a buffer effect against the impacts of potential

seasonal flooding on lands adjoining the lake and downstream of Athlone on the Shannon callows. Lake levels are drawn down by opening the sluice gates on Athlone Weir and increasing the downstream flows from the lake (provided downstream levels permit i.e. < 33.42mODM). The agreed minimum operational and target levels for Lough Ree restrict the rate of drawdown in order to ensure that minimum navigation requirements are met over the relevant periods.

4.7.4 Regulations and Guidance for Control of River Shannon (Lough Derg)

The ESB "Regulations and Guidelines for Control of the River Shannon" prescribe the lake levels, which must be implemented and maintained in Lough Derg under a range of operating conditions at Ardnacrusha. Summary details of Regulation requirements in respect of Lough Derg lake levels are illustrated in **Table 4.6.**

Table 4.6 Lough Derg Operating Levels

Maximum Normal Operating Level	30.86mODM
Minimum Normal Operating Level	30.40mODM
Minimum Statutory Low Water Level	29.30mODM
Minimum Level to Facilitate Navigation	30.10mODM
Dam Crest Level (Fort Henry/Ardclooney Embankments)	32.30mODM
Maximum Level Parteen Basin	31.30mODM

Minimum and maximum operational water levels have been established by ESB (in conjunction with relevant stakeholders) for management of Ardnacrusha / the Headrace / Parteen Basin and Lough Derg.

The Shannon outflow from Lough Derg (during non-flood periods) is used for Power Generation at Ardnacrusha, apart from:

- Compensation flows to the River Shannon at Parteen Weir (10m^3/sec minimum)
- The flow through the fish pass at Ardnacrusha (0.7m^3/sec)
- Water abstraction by Limerick City Council (0.40 m^3/sec taken from the Headrace - Cloonlara)

The four turbines at Ardnacrusha can generate 80MW of power at maximum or near maximum throughput (4 turbines @ ≈ 100m^3/sec each = 400m^3/sec). Water levels at Ardnacrusha, Parteen Basin and in Lough Derg are managed in order to achieve maximum generation efficiencies whilst

simultaneously ensuring that the rate of drawdown and operational levels are controlled within agreed limits.

During flood periods Ardnacrusha generates power at the maximum flow rate through the plant (400m^3/sec) and the excess flood-flows (potentially > 300m^3/sec) are discharged from Parteen Weir to the River Shannon thereby giving rise to potential flood conditions. Because of restrictions in the channel at Killaloe, flood flows exiting from Lough Derg can also create back-up flooding upstream.

4.7.5 Regulations and Guidance for Control of River Shannon (Parteen)

Summary details of Regulation requirements in respect of Lough Derg lake levels are illustrated in **Table 4.7.**

Table 4.7 Parteen Basin / Headrace Minimum and Maximum Operation Levels

Minimum Level Ardnacrusha	28.80mODM
Minimum Level Headrace & Fort Henry / Ardclooney Embankments (Parteen Basin) to ensure 28.80mODM at Ardnacrusha	29.90mODM
Minimum Level in Parteen Basin to ensure 28.80mODM at Ardnacrusha at Max Output	30.00mODM
Minimum Level in Parteen Basin to ensure Dam/Embankment Safety	29.90mODM
Maximum Level in Parteen Basin to ensure Dam / Embankment Safety	31.30mODM
Min Level Pier Head (between Killaloe & L Derg) to ensure flow/gradient for Max Output at Ardnacrusha	30.40mODM
Minimum Normal Operational Level Lough Derg	30.40mODM
Minimum Agreed Navigational Level Lough Derg	30.10mODM
Maximum Normal Operational Level Lough Derg	30.86mODM

4.7.6 Modelling Results: Option A Lough Ree

The modelling results for 1995, **Figure 4.1** demonstrate that the operational target levels for lake level management (green line - target) could have been achieved from May to September (blue line - simulated) by operating the sluices in a manner which would have restricted drawdown to a much greater extent than actually occurred in practice (black line - recorded).

The level variations between recorded (actual) and simulated (optimised sluice operation) occur for a number of reasons

- Sluices are operated manually in an intermittent fashion in accordance with “water level” based guidelines. In contrast computer modelling can fine tune sluice operations on a continuously monitored basis to achieve closer proximity to desired target levels

- Sluices are operated in real time requiring some judgement to be exercised based on prevailing and anticipated weather conditions. Consequently, draw-downs for flood mitigation, in anticipation of heavy rainfall, for example, will reduce lake levels below target levels if the predicted weather does not subsequently materialise as forecast.

In the 1995 simulation, **Figure 4.1**, lake levels for navigation purposes are frequently less than target levels but are generally above the agreed minimum operating levels for the relevant periods in question. In the modelling simulations, flows downstream of Athlone are maintained in excess of a minimum 12m^3/sec. Again from **Figure 4.1** (upper graph) the actual durations of minimum flow conditions (blue line) were longer in reality than could have been achieved by optimised operation of sluices (red line) to achieve target lake levels as outlined above.

The modelling of water abstraction impacts assumes that sluice operations are optimised to achieve target lake levels. The results of 350Mld continuous abstraction in the optimised scenario are illustrated for lake levels and flows in **Figure 4.2.**

Modelling of abstractions (**Figure 4.2**– lower graph) show that lake levels (red line) would fall below simulated / target levels as a result of abstraction. The reduced lake level is still higher than the agreed minimum operating level and as such is in compliance with the requirements of the regulations. The resultant lake level (after abstraction – **Figure 4.2** red line) is also higher than the recorded lake level for 1995 (**Figure 4.1** – lower graph – black line). **Figure 4.2** (upper graph) illustrates that minimum flow durations as a result of abstraction (red line) are longer than simulated minimum low flow durations.

4.7.6.1 Conclusions Lough Ree Option A

The level variations between recorded (actual) and simulated (optimised sluice operation) occur for a number of reasons:

- Sluices are operated manually in an intermittent fashion in accordance with “water level” based guidelines. In contrast computer modelling can fine tune sluice operations on a continuously monitored basis to achieve closer proximity to desired target levels

- Sluices are operated in real time requiring some judgement to be exercised based on prevailing and anticipated weather conditions. Consequently, draw-downs for flood mitigation, in anticipation of heavy rainfall, for example, will reduce lake levels below target levels if the predicted weather does not subsequently materialise as forecast.

A continuous abstraction of 350Mld from Lough Ree can only be achieved within the Regulations in a situation where sluice operations are modified / optimised to ensure target levels are achieved. In reality this would require reducing the rates of drawdown from Lough Ree resulting in greater retention of water in the lake which in turn would benefit navigation and water abstraction but at the probable expense of increasing flood risk around Lough Ree and downstream on the callows.

Continuous abstractions of 350Mld from Lough Ree, in a situation where sluices are operated as at present, would result in breaches of current Regulations in respect of specified minimum lake levels. In this situation abstraction levels would have to be scaled back at different stages during dry years to ensure compliance with Regulations. Alternatively the minimum downstream requirement ($12m^3$/sec) would have to be modified.

Figure 4.1 Modelling of Lake Levels and Downstream Flows – Lough Ree 1995

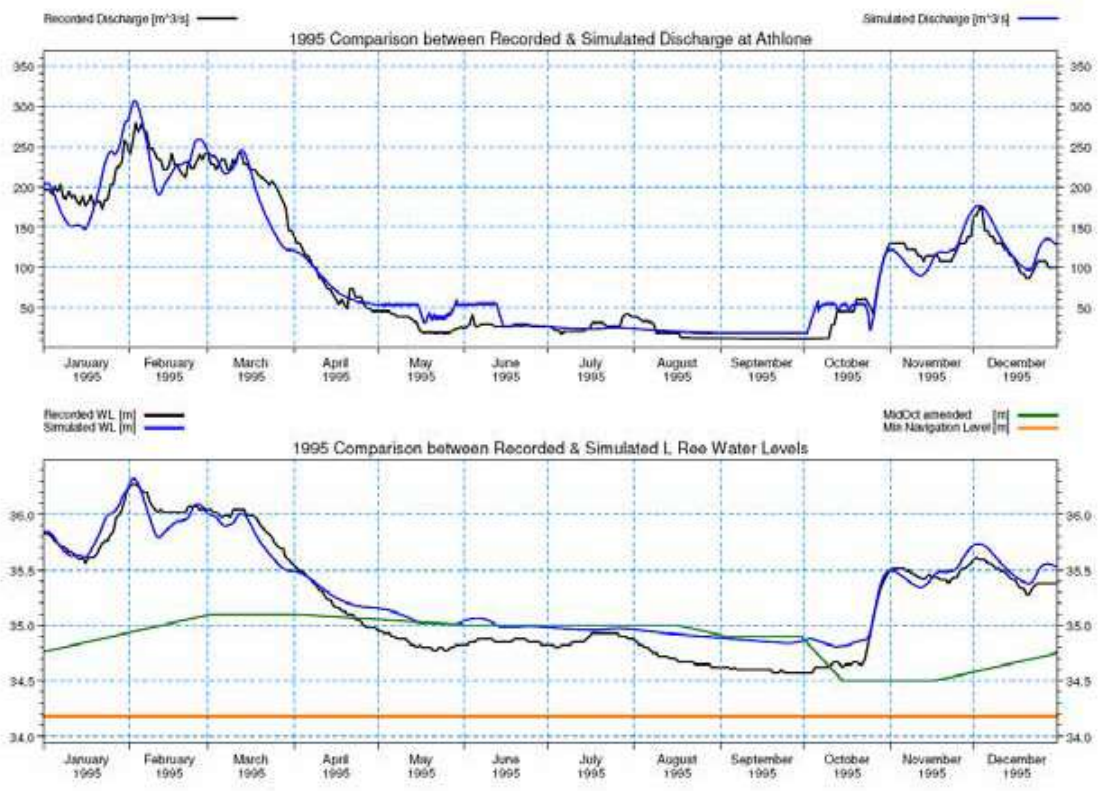
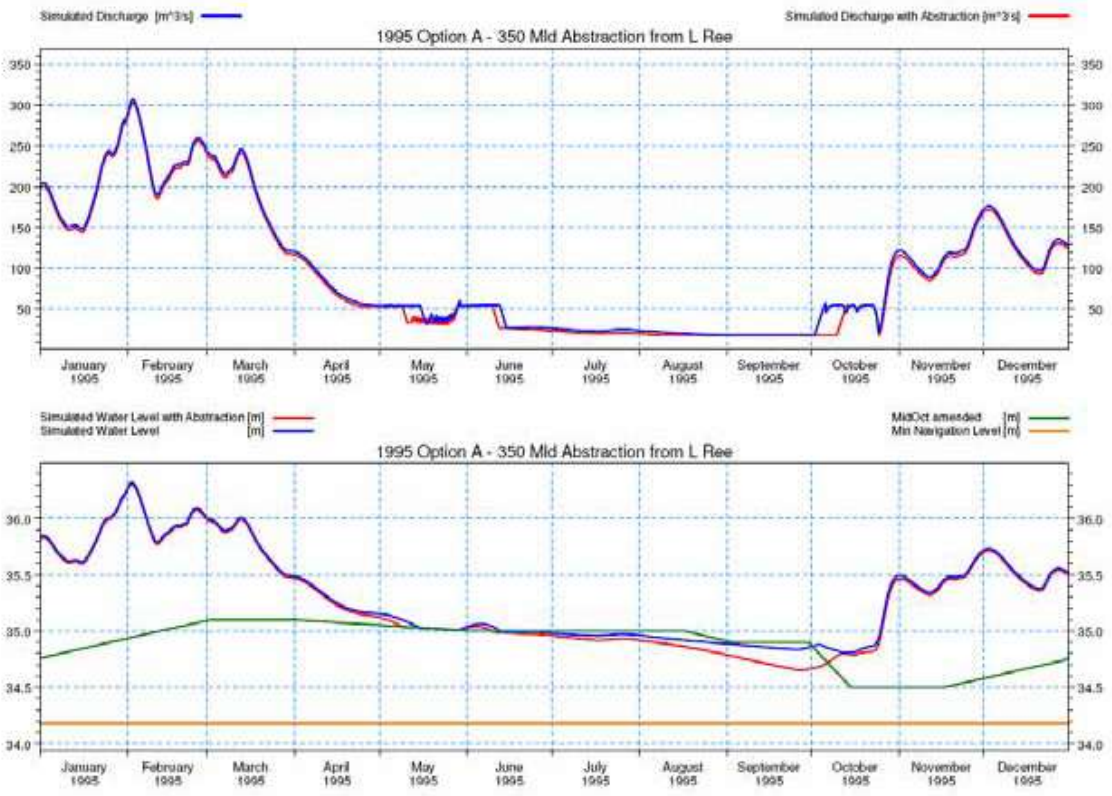


Figure 4.2 Modelling of Abstraction Impacts on Lake Levels and D/S Flows - L Ree 1995



4.7.7 Modelling Results: Option B Lough Derg

Modelling results are summarised in **Table 4.8.** Abstractions will not result in changes to lake levels since Ardnacrusha generation activities (with ESB approval) can be modified to compensate for marginal reduction in flows. Reductions in flow will give rise to low increases in residence times during dry periods of approx 5%.

Table 4.8 Summary of Abstraction Impact Modelling Results – L Derg 1995

Abstraction of 350Mld modelled for dry year and including future climate change scenarios	Lake levels unchanged through minor modifications to ESB generating output
Lough Derg Residence Times Impacts as a result of 350Mld abstraction during dry years	Residence Time of 123 days extends to 130 days as a result of reduced flow
Lough Derg Residence Times Impacts as a result of 350Mld abstraction in climate change scenarios	Residence Time of 124 days extends to 131 days as a result of reduced flow

As for Option A Lough Ree, abstraction impacts on Lough Derg's lake levels and flows were assessed based on a continuous abstraction of 350Mld for 1995. Climate change impacts were also assessed. Modelling simulations assume that Ardnacrusha generation activities are modified (with ESB approval) to reflect the 1% – 2% reduction in flows, which arise from a 350Mld ($4m^3$/sec) abstraction from the northern section of Lough Derg.

Lough Dergs water levels are managed within a narrow band (460mm) - minimum normal operating level of 30.40mODM and maximum normal operating level of 30.86mODM. These upper and lower ranges are illustrated (green lines) in **Figure 4.3** (lower graph). Recorded lake levels for 1995 are illustrated (red line). Recorded lake levels in any year are the net result of inflows to the lake and outflows from the lake, 95% of which are diverted at Parteen Weir into the headrace for generation purposes at Ardnacrusha. If Ardnacrusha generation output is marginally modified to reflect the abstraction flows the resultant lake level will remain the same as for the non-abstraction recorded levels. Consequently, recorded levels and simulated abstraction levels are practically identical as illustrated in **Figure 4.3** (lower graph).

Flows through Lough Derg, in the abstraction scenario, will be reduced by the amount of water abstracted. The reduction in flow through the lake will not give rise to lower lake levels since Ardnacrusha generation activities are modified to reflect the marginal reduction in flows as a result of abstraction. The reduced flow through the lake will give rise to a marginal increase in water residence times in the lake.

4.7.7.1 Lough Derg Residence Time

In order to assess the effect of the water abstraction on the limnology of Lough Derg, a two dimensional model of Lough Derg was used. This model includes the lake area of Lough Derg from Portumna (inflow of the Shannon) to Killaloe.

The boundary conditions for the model were derived from observed water levels as well as simulated flows. The water level at Killaloe was kept constant at a level of 30.4 m OD Malin (33.1m OD Poolbeg) to simulate the rules implemented by ESB at Parteen Weir. The inflows were derived from the river model used to assess the overall impact on the catchments. Inflow was included for the upper and middle Shannon, (with and without abstraction at Lough Ree), the Graney, Kilkrow and the Nenagh. All four rivers were included as point sources simulation the inflow at the location where they discharge into the lake. In addition the area around the lake and the smaller streams were included as overall contribution to the lake. Further rainfall and evaporation on the lakes surface was also simulated further details on abstraction and inflow figures are given in **Appendix B** of the draft Plan.

Residence times in lakes vary over the yearly weather cycle ranging from short durations in high flow winter type conditions to longer periods in dry summer flow conditions. The inflows were simulated for a period of 155 days starting on the 30th April 2000 and continuing to the 2nd October 2000. This included a particular long low flow interval from mid June to the end of September. In the resulting flow paths the tracks show the average flow starting at four different locations in the upstream section of the Lough. A number of paths through the lake are possible and the path of shortest duration was selected for impact assessment purposes. It can be seen that it takes 123 days for the flow entering Lough Derg at the 15th May 2000 to reach Killaloe. The modelling identified that abstraction would increase residence times in dry years from 123 days (without abstraction) to 130 days (with abstraction).

4.7.7.2 Conclusions Lough Derg Option B

Abstractions from Lough Derg are less complex to evaluate because of better control of levels and flows via Ardnacrusha and a much greater volume of water availability due to the increased catchment contributing to flows. If Ardnacrusha generation output is marginally modified (with ESB approval) to

reflect the (1% - 2%) reduction in flows as a result of abstraction, the Lough Derg lake level will remain the same as for the non-abstraction recorded levels. Consequently, recorded levels and simulated abstraction levels are practically identical as illustrated in **Figure 4.3** (lower graph)**.**

4.7.8 Modelling Results: Option C Parteen

As for Options A and B, abstraction impacts on Parteen Basin's levels and flows were assessed based on a continuous abstraction of 350Mld for 1995. Climate change impacts were also assessed. Modelling simulations assume that Ardnacrusha generation activities are modified (with ESB approval) to reflect the 1% – 2% reduction in flows, which arise from a 350Mld ($4m^3$/sec) abstraction from Parteen Basin at Parteen Weir as illustrated on **Figure 4.4**.

Parteen Basin's water levels are managed within a 1400mm operational band - minimum permissible operating level of 29.90mODM and maximum permissible operating level of 31.30mODM. These upper and lower range limits are illustrated (green/orange lines) in **Figure 4.4** (lower graph). Recorded levels in Parteen Basin for 1995 are illustrated (blue line). Parteen Basin recorded water levels in any year are the net result of inflows to the basin and outflows from the basin. Outflows from Parteen Basin take place at Parteen Weir. Minimum compensation flow of $10m^3$/sec is provided to the Shannon River and the remainder (≈ 95%) is diverted into the headrace for power generation purposes at Ardnacrusha. The proposed abstraction of water for Dublin would be taken from flows into the headrace. If Ardnacrusha generation output is marginally modified (with ESB approval) to reflect the abstraction flows the resultant Parteen Basin water levels will remain the same as for the non-abstraction recorded levels (red line – lower graph). ESB will require compensation for abstracted water leaving the catchment which otherwise would have been available for generation.

4.7.8.1 Conclusions Parteen Option C

Parteen Basin's water levels are managed within a 1400mm operational band - minimum permissible operating level of 29.90mODM and maximum permissible operating level of 31.30mODM. Dam safety is a prime consideration in ensuring operation within these limits. Parteen Basin recorded water levels in any year are the net result of inflows to the basin and outflows from the basin. Outflows from Parteen Basin take place at Parteen Weir. Minimum compensation flow of $10m^3$/sec is provided to the Shannon River and the remainder (≈ 95%) is diverted into the headrace for power generation purposes at Ardnacrusha. The proposed abstraction of water for Dublin would be taken from flows into the headrace. If Ardnacrusha generation output is marginally modified (with ESB approval) to reflect the abstraction flows, the resultant Parteen Basin water levels will remain the same as for the non-abstraction recorded levels. ESB will require compensation for abstracted water leaving the catchment which otherwise would have been available for generation.

Figure 4.3: Modelling of Abstraction Impacts on Lake Levels and D/S Flows L Derg1995

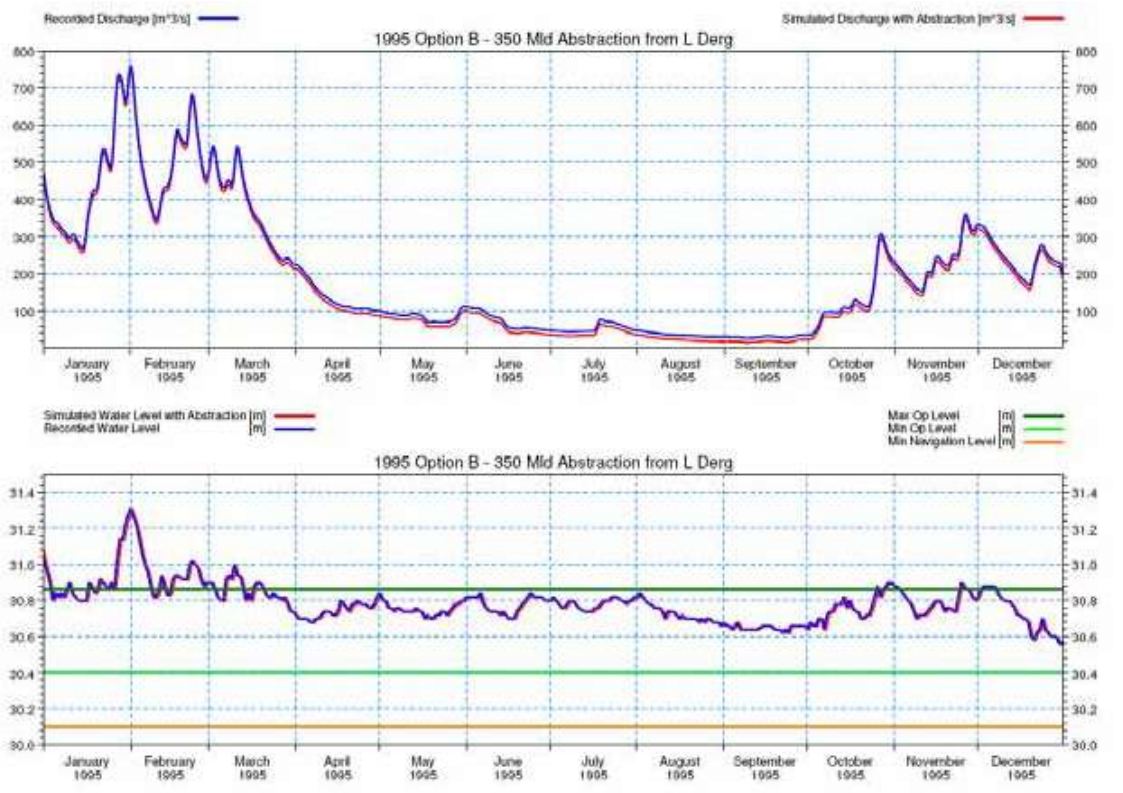
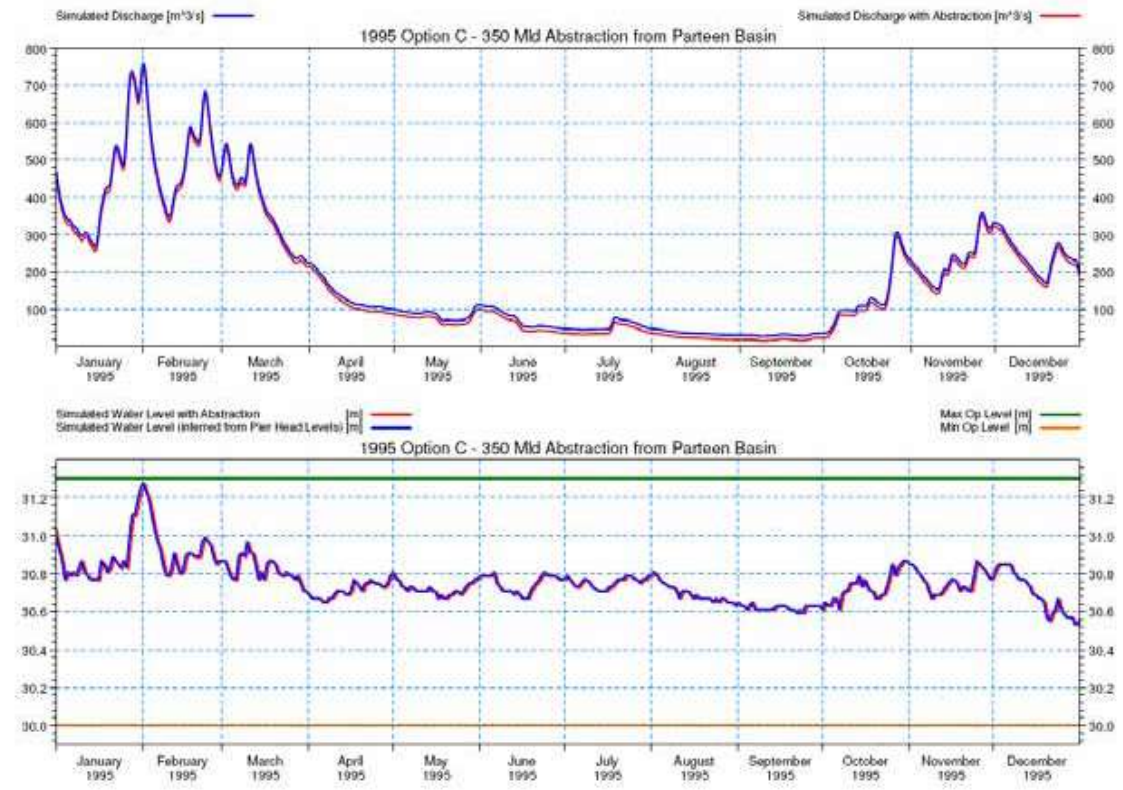


Figure 4.4: Recorded and Simulated Levels in Parteen Basin



4.7.9 Modelling Results: Option D Lough Ree and Lough Derg

This option includes phased abstraction from Lough Ree (250Mld) and Lough Derg (100 Mld). The abstraction is similar in nature to Option A, but the principal difference is that the continuous abstraction of 350Mld (Option A) has been reduced to 250Mld for Option D. The specified levels and flows contained in the Shannon Regulations and Guidelines are also applicable to this Option D.

The modelling conclusions for 250Mld abstraction from Lough Ree are similar to the conclusions for 350Mld abstraction. A continuous abstraction of 250Mld from Lough Ree can only be achieved within the Regulations in a situation where sluice operations are modified / optimised to ensure target levels are achieved.

4.7.9.1 Conclusion Lough Ree and Lough Derg Option D

Continuous abstractions of 250Mld from Lough Ree, in a situation where sluices are operated as at present, would result in breaches of current Regulations in respect of specified minimum lake levels. These breaches would be less severe than for 350Mld as per Option A. In this situation abstraction quantities would have to be scaled back for short periods during dry years to ensure compliance with Regulations.

4.7.10 Modelling Results: Option E Lough Ree with Bog Storage

Water supply Option E, abstraction from Lough Ree, addresses abstraction impact concerns through the creation of off-site raw water storage facilities in former/cutaway bogs. The proposed storage facilities enable abstractions from the Shannon at Lough Ree to be modified to reflect prevailing rainfall and associated flow conditions over the yearly weather cycle. In high winter flows or flood conditions, higher water quantities can be pumped from the Shannon into the storage facilities for later use during drier Summer periods when abstractions from the Shannon can be scaled back to reflect the lower or dry flow conditions.

Option E abstraction is similar in nature to Option A. The principal difference is that the continuous (Jan – Dec) abstraction of 350Mld of Option A has been increased to 500Mld from November to June and reduced to minimum throughput of 50Mld from July to October inclusive. This abstraction pattern enables raw water to be pumped to Rochfortbridge former bog site during Shannon high flow months for subsequent use in drier periods when abstractions from the Shannon can be significantly scaled back. All other data regarding specified levels and flows contained in the Shannon Regulations and Guidelines are also applicable to Option E.

4.7.10.1 Conclusion Lough Ree with Bog Storage Option E

A continuous abstraction of 500Mld from Lough Ree from November to June followed by minimum abstractions of 50Mld from July to October can be achieved within the constraints of the ESB Regulations. Sluice operation at Athlone are unlikely to require modification from Nov to June but may require minor modification from July to October in dry years to ensure navigation levels are not breached. Durations of minimum flow periods are marginally extended as a result of this abstraction regime.

4.7.11 Modelling Results: Option F1 & F2 Lough Derg with Bog Storage

Option F abstraction is similar in nature to Option B. The principal difference is that the continuous (Jan – Dec) abstraction of 350Mld in Option B has been increased to 410Mld from mid October to mid August and reduced to minimum throughput of 50Mld from mid Aug to mid October. This abstraction pattern enables raw water to be pumped to Rochfortbridge former bog site during Shannon higher flow months for subsequent use in drier periods when abstractions from the Shannon can be significantly scaled back. All other data regarding specified levels and flows contained in the Shannon Regulations and Guidelines are also applicable to Option F.

As per Option B a continuous abstraction of 410Mld from Lough Derg from mid October to mid August followed by minimum abstractions of 50Mld from mid Aug to mid October can be achieved within the constraints of the ESB Regulations. Modelling simulations assume that Ardnacrusha generation activities are modified (with ESB approval) to reflect the 1% – 2% reduction in flows which arise from the Lough Derg abstractions.

4.7.11.1 Conclusion Lough Derg Option F1 and Option F2

A continuous abstraction of 410Mld from Lough Derg from October to August followed by minimum abstractions of 50Mld from August to October can be achieved within the constraints of the ESB Regulations.

4.7.12 Modelling Results: Option G Lough Ree with Impoundment

Option G (Lough Ree) abstraction is similar in nature to Option A. The principal difference is that the continuous (Jan – Dec) abstraction of 350Mld (Option A) has been increased to 420Mld from November to June and reduced to minimum throughput of 60Mld from July to October inclusive. This abstraction pattern enables raw water to be pumped to storage in a proposed impoundment for subsequent use in drier periods when abstractions from the Shannon can be significantly scaled back.

All other data regarding specified levels and flows contained in the Shannon Regulations and Guidelines are also applicable to Option E.

4.7.12.1 Conclusion Lough Ree Option G

A continuous abstraction of 420Mld from Lough Ree from November to June followed by minimum abstractions of 60Mld from July to October can be achieved within the constraints of the ESB Regulations. Sluice operation at Athlone is unlikely to require modification from Nov to June but may require minor modification from July to October during dry to ensure navigation levels are not breached.

Minimum downstream flows at Athlone of 12m^3/sec can be maintained at all times. Durations of minimum flow periods are marginally extended as a result of this abstraction regime.

4.7.13 Summary of Low Flows and Residence Times for all Options

The following table provides a summary of all of the Shannon options and the main output from the hydrological and hydraulic modelling.

Table 4.9 Summary of Modelling Results

Option	Volume (Mld)	Duration (Months in Year)	Low Flow Days (betw. Athlone & Portumna) 1995 Scenario	Minimum Low Flow Residence Time Lough Derg (Apr to Oct 2000)	Water Levels
A (abstraction Lough Ree)	350	12	46 to 70	123 to 130	Change in predicted water levels in L. Ree and breach of Shannon regulations if sluice gate is operated as existing.
B (abstraction Lough Derg)	350	12	Not applicable	123 to 130	No change in predicted water levels in L. Derg, reduced flow to Ardnacrusha
C (abstraction Parteen)	350	12	Not applicable	Not applicable	No change in predicted water levels in L. Derg, reduced flow to Ardnacrusha
D (abstraction Lough Ree & Lough Derg)	250 Lough Ree & 100 Lough Derg	12	46 to 63	123 to 130	Change in predicted water levels in L. Ree and breach of Shannon regulations if sluice gate is operated as existing. No change in predicted water levels in L. Derg, reduced flow to Ardnacrusha
E (abstraction Lough Ree & storage in former bogland areas)	500 50	8 4	46 to 50	No change from 123 days	Minor modifications to sluice gates will ensure lake levels remain within guidelines
F1 (abstraction from Lough Derg and storage in former bogland areas)	410 50	10 2	Not applicable	123 to approx 126	No change in predicted water levels in L. Derg, reduced flow to Ardnacrusha
F2 (abstraction from Lough Derg and storage in former bogland areas)	410 50	10 2	Not applicable	123 to approx 126	No change in predicted water levels in L. Derg, reduced flow to Ardnacrusha
G (abstraction from Lough Ree and storage in impoundment site in Wicklow Mountains)	420 60	8 4	46 to 51	No change from 123 days	Minor modifications to sluice gates will ensure lake levels remain within guidelines

4.8 DESALINATION PLANT - MODELLING

4.8.1 Introduction

Modelling of the brine dispersion for the Desalination Plan was undertaken using numerical modelling techniques to simulate the dispersion of effluent associated with the desalination process. The effluent is comprised of coagulants and antiscalants along with the brine. Details of the Desalination Plant Dispersion Modelling are contained within the draft Plan.

4.8.2 Modelling Scenarios Desalination Plant

Modelling identified that discharge at 2km from shore was required to ensure environmental sustainability of brine dispersion. The dispersion levels at this distance from shore are suitably high due to the tidal regime and high current speeds in the vicinity of the proposed discharge site.

The levels of suspended solids, iron and salt were found to be within acceptable levels outside of the immediate vicinity of the discharge site. Sedimentation levels resulting from the sludge dispersal were found to be low, with very limited settlement occurring during slack water, which is subsequently re-suspended and dispersed as current speeds increase as the tidal cycle progresses.

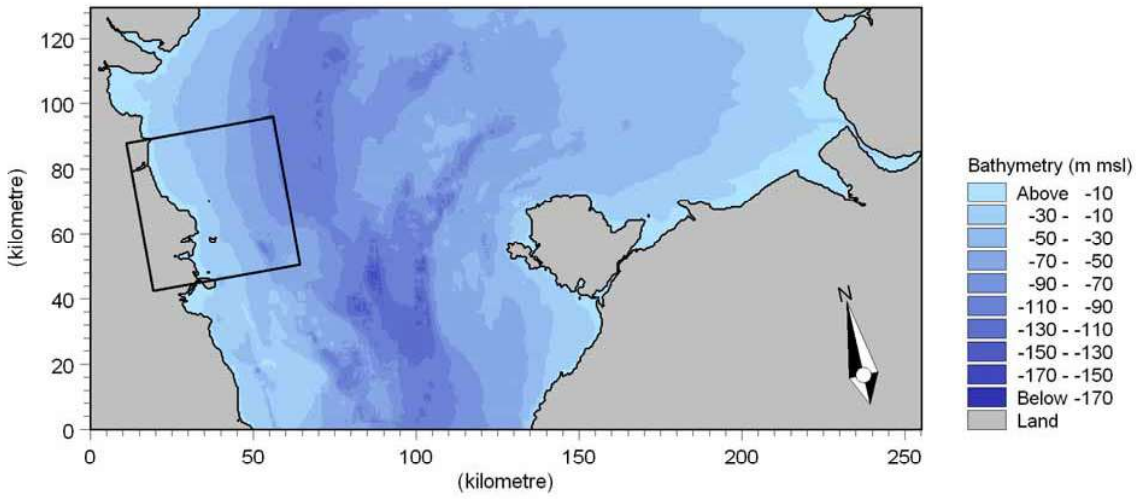
4.8.3 Tidal Model

The tidal flow simulations were undertaken using the MIKE21 HD and NHD flow model. It models the effluent dispersion and environmental hydraulics. The module is 2–dimensional and simulates the water level variations and flows. The water levels and flows are resolved on a rectangular grid covering the area of interest when provided with the bathymetry, bed resistance coefficient, wind field and hydrodynamic boundary conditions.

The outfall was assumed to have 10 ports at 10m centres and designed to jet the brine up into the water column. The brine will be more dense than the surrounding seawater. There will be a tendency for the brine plume to initially sink, but the eddying in the water column will mix the brine and seawater as the tidal currents flow across the outfall area.

Figure 4.5 shows the extent of the base model for the desalination discharge study.

Figure 4.5 Base Model



The model was used to simulate tidal flow patterns for a period of one month to include both neap and spring tides. Spring tides will give the largest extent of any plume while neap tide produces a reduced plume area but it will be of a higher concentration. The modelling took place for the 'worst case' scenario. The discharge of brine with the sludge dispersion took place at the highest (Phase 2) discharge level (300 Mld).

4.8.4 Modelling Results

The results were presented in the form of maximum and average plume envelopes. All of the plume models can be found in the full report which accompanies the draft Plan.

4.8.4.1 Discharge Characteristics

Table 4.10 and **Table 4.11** outline the concentrations within the brine dispersion.

Table 4.10 Characteristics of Brine Discharge without Sludge Dispersion

Brine Discharge Stream Characteristics *without sludge dispersion*		
Volumetric Flow Rates		
	Phase 1	Phase 2
Production capacity MLD	200	300

Brine Discharge Stream Characteristics *without sludge dispersion*		
Volumetric Flow Rates		
Intake : raw water flow m3/d	476,430	714,640
Outfall : reject stream flow m3/d	276,430	414,640
Salt/Pollutant Concentrations in Brine Discharge		
	Lower	Upper
SS mg/L	<1	<1
Coagulant - Iron ($FeCl_3$) mg/L	0	0
Antiscalant - Phosphonate (P_20_5) µg/L	200	300
Salt concentration in Brine g/L	62	69

Table 4.11 Characteristics of Brine Discharge with Sludge Dispersion

Brine Discharge Stream Characteristics *with sludge dispersion*		
Volumetric Flow Rates		
	Phase 1	Phase 2
Production capacity MLD	200	300
Intake : raw water flow m3/d	476,430	714,640
Outfall : reject stream flow m3/d	291,460	437,185
Salt/Pollutant Concentrations in Brine Discharge		
	Lower	Upper
SS mg/L	27	56
Coagulant - Iron ($FeCl_3$) mg/L	33	57
Antiscalant - Phosphonate (P_20_5) µg/L	200	300
Salt concentration in Brine g/L	62	69

4.8.5 Conclusion of Brine Modelling

The results show that with a the brine jetted up into the water column using the 10 port diffuser design outlined in this study, there will generally be sufficiently dilution of the brine before it sinks to the

seabed to avoid a significant increase in salinity at the seabed around the outfall. Only for very short periods around slack water will the salinity increase.

Generally the plume excursion characteristics showed that dispersion levels in the region of the outfall were high due to the high current speeds in the vicinity; specifically around the Skerries to the north and to the south at Rogerstown Inlet.

Suspended sediment assuming no sedimentation shows that levels of sediment within the water column fall below a maximum of 1mg/l away from the immediate vicinity of the outfall. The EPA prescribes that the maximum allowable impact is a 30% rise in background levels.

The sedimentation levels experienced during the discharge cycle which are in general very low. Sedimentation occurs to a depth of 1mm in the vicinity of the outfall during slack water. This material is re-suspended and dispersed as current speeds increase through the tidal cycle. The suspended sediment shows the greatest levels at the bed with a reduction towards the surface with the material being dispersed as it progresses through the water column.

For the brine discharge the allowable increase is limited to a 10% increase in background levels. With maximum values less than 1.5 g/l and a background of 35g/l, discharges are well within the acceptable levels.

The levels of suspended solids, iron and salt were found to be within acceptable levels outside of the immediate vicinity of the discharge site. Sedimentation levels resulting from the sludge dispersal were found to be very low with very limited settlement occurring during slack water. This is subsequently re-suspended and dispersed as current speeds increase as the tidal cycle progresses.

4.9 POTENTIAL IMPACTS ON EUROPEAN SITES

4.9.1 Introduction

The construction and operation of the structures required to fulfil the draft Plan to provide a new major water source for the Dublin Region has the potential to impact upon the habitats and species present within the European sites considered in this report. It must be acknowledged by the reader that the draft Plan is as such, a Plan, and that adoption of the Plan and the associated option or combination of options will require a full Environmental Impact Statement to be undertaken. Depending on the chosen option and following consultation from this HDA, another Habitats Directive Assessment may be required at the project Environmental Impact Assessment stage.

4.9.2 Construction

Construction operations carried out in or adjacent to marine or freshwater waterbodies have the potential to cause negative impacts, which in some cases may be significant.

4.9.2.1 Pollution

The operation of plant and machinery in the vicinity of a waterbody has the potential to cause negative impacts. The release of chemicals such as diesel, hydraulic fluid, etc from machinery can occur as the result of leaks or accidental spillage during refuelling and maintenance. These chemicals can have significant negative effects on aquatic ecology with lethal and sub-lethal effects on macroinvertebrates, fish, mammals, birds and plants.

4.9.2.2 Suspended Solids

Construction works in and adjacent to waterbodies have the potential to impact on aquatic ecology through the release of suspended solids into the water column. High levels of suspended solids can impact negatively on ecology by means of smothering habitats, plants and sessile animals, reducing light penetration, which would effect predation and photosynthesis, and have impacts on fish through the clogging of gills.

An increase in suspended sediment could negatively impact on waterfowl populations if the growth of submerged aquatic vegetation is reduced through poorer water clarity. Increased suspended solids also reduce visibility in the water column thereby reducing feeding potential for diving and bottom feeding species.

4.9.2.3 Loss of Habitat

Construction works are likely to result in the permanent or temporary loss of habitat. The installation of the abstraction points, pipelines and other infrastructure necessary to fulfil the needs of the plan will result in the carrying out of excavations, potentially in lakebed, lakeshore, marine subtidal and intertidal habitats. The significance of this impact will depend on the construction methodologies used and the exact location of the works. Specific areas, such as the north shore of Lough Derg, support extensive areas of Annex habitat fringing the shoreline and rare species, such as the Irish fleabane (*Inula salicina*). The location of any structure within lakeshore habitats would need to be carefully selected following detailed surveys and consultation to avoid impacts on qualifying features and rare species.

4.9.2.4 Disturbance to Marine Mammals

The noise and activities related to construction have the potential to impact on sensitive mammals. Otters and seals have been identified as qualifying features of SACs within the study area. While the disturbance of otters is limited to the construction activities, seals may also be exposed to impacts from acoustic surveys.

It may be necessary to carry out acoustic surveys of the seabed as part of the design process in order to select the optimum route for the intake and discharge pipelines. The use of active acoustic devices is recognised to have the potential to impact negatively on marine mammals particularly cetaceans, which depend on sound for navigation, foraging and communication.

Anthropogenic sound in the marine environment has the potential to impact on marine mammals in a number of ways including the exclusion of animals from areas, alteration to their behaviour, physical damage, interference with foraging and communication, etc.

The NPWS has published a Code of Practice for the Protection of Marine Mammals during Acoustic Seafloor Surveys in Irish Waters (NPWS, 2007) and these guidelines must be consulted in the planning of any site investigation works.

4.9.2.5 Disturbance to birds

Lough Ree, Lough Derg and the Shannon Callow are SPAs supporting wintering and breeding waterfowl. They support Annex I species including whooper swan, Greenland white-fronted goose and the common tern, along with other significant species that are sensitive to disturbance. Construction activities have the potential to negatively impact on wildfowl through a combination of noise, movement and vibration. Disturbance from construction work can affect the densities and feeding behaviour of waterfowl (Burton *et al*., 2002). Birds are most sensitive during breeding season and construction during this time should be avoided. Sensitivities can also vary according to species. The impacts of disturbance from construction would be temporary in nature and limited to a relatively small portion of the lakeshore area.

4.9.3 Operation

The operation of the facilities intended to fulfil the Plan for providing a new major water supply for the Dublin Region has the potential to have significant effects upon aquatic and terrestrial ecology of European sites. The potential impacts vary depending on the option chosen, with surface abstraction and desalination the two broad areas that will be considered.

4.9.3.1 Abstraction

The abstraction of water from waterbodies that are within or form a European site can have the potential to have significant effects on these sites. These potential effects relate to changes in water level, changes to downstream flows, changes to lake retention time and impingement and entrainment of fish. The inter-catchment transfer of water from the Shannon Catchment also has significant potential to spread invasive species.

Changes in Lake Water Levels

The water levels of Lough Ree and Lough Derg are currently under the control of the ESB. The water levels in the lakes currently show considerable variation, with flooding particularly prevalent on Lough Ree during the winter months, while Lough Derg is generally maintained within a 460 mm band. The flora and fauna of the lakes is adapted to some variation in water level inter-annually and intra-annually, as evidenced by the presence of a number of species adapted to fluctuating water levels, such as common spike rush, reed sweet-grass, shoreweed, fine-leaved dropwort, reed canary grass, great yellow-cress (Preston & Croft, 1997).

Modelling has shown that the levels in Lough Derg will be maintained as they currently stand through the operation of the controls at Parteen. Therefore, the impacts associated with fluctuating water levels are not an issue for Lough Derg as they are for Lough Ree.

The abstraction of water from Lough Ree could cause changes to the water levels, particularly in the summer or during other dry spells. The water level in Lough Ree is currently controlled mainly by the operation of sluices at Athlone Weir, which are operated by Waterways Ireland under the direction of the ESB (Cullen, 2002).

The water level in Lough Derg is controlled by the operation of the Parteen Weir, which controls the flow of water down the River Shannon channel and down the headrace to Ardnacrusha for electricity generation. In flood conditions, Ardnacrusha operates at full capacity (400 m^3/s), with the remaining discharge released down the River Shannon from the Parteen Weir (Cullen, 2002).

The impact of a reduction in water level on a lake will depend on a number of factors including the magnitude of the reduction, the time of year, the profile of the lakebed and the duration. Reductions in lake water level can have an impact on many elements of a lake ecosystem including water quality, macrophytes (Riis & Hawes, 2002, Richardson *et al.,* 2002, Havens *et al*., 2004, Paillison & Marion, 2006), fish (Karenge & Kolding, 1995) and macroinvertebrates (Kaster & Jacobi, 1978, Richardson *et al.,* 2002, Furey *et al.,* 2006). Small variations in lake water levels have been found to have significant effects on the biomass of the white water lily *Nymphea alba,* with higher above-ground biomass recorded in years of low water levels (Paillison & Marion, 2006). Species diversity has also been found to be affected by fluctuations in water level, with diversity increasing where the drop in water level

lasted up to one month, but decreasing for periods longer than one month (Riis & Hawes, 2002). Havens *et al.* (2004) found that the species composition of a lake altered considerably after the water level was reduced by 2m following a number of years of high water levels. Kaster & Jacobi (1978) found that draw-down in a reservoir had effects on macroinvertebrate distribution, abundance and composition, with groups such as the Ephemeroptera, Plecoptera and Trichoptera, amongst others, less common than in non-fluctuating reservoirs. Similarly, Richardson *et al*. (2002) found that reductions in water levels had negative impacts on the littoral macroinvertebrate community and virtually eliminated all species of insect and mollusc from the exposed area. The impact of water level reduction or fluctuation on fish populations is variable and has been shown to have positive and negative impacts on fisheries (Karenge & Kolding, 1995)

In terms of Lough Ree, a reduction in water levels during the winter could expose pollan spawning grounds, while in early summer the impact would be on the spawning of coarse fish and pike, which mostly spawn in the areas of aquatic vegetation. In areas where the lakebed falls away rapidly from the shore, the area of suitable nursery ground for juvenile fish would be reduced. Plant species that are tolerant of only a narrow range of water depths may die through drying out. The more diverse macroinvertebrate communities of the shallow waters would be impacted negatively, which would have knock-on effects on fish and bird species feeding on them.

In situations where wetlands dry completely, vegetation invasion influences use and wetland birds may be replaced by species that prefer dryer sites (Weller, 1999). Changes in water levels could also adversely affect species nesting on islands such as common terns and black-headed gull, a recent addition to the Red List (Lynas *et al*., 2007). A significant drop in water levels in shallow waters could potentially create access for predators on the mainland to the islands.

In wetlands, vegetation mosaics and gradients form primarily in response to variations in water levels. Keedy (2000) compares shoreline gradients to prisms where ecological communities are separated out into sequential zones. A steep shoreline will compress the vegetation zonation while a shallow shoreline will give an elongated zonation. Lough Derg has a relatively steep shoreline where variations in water levels would affect vegetation zonations to a lesser affect than in Lough Ree, which has a shallow shoreline.

The processes of inundation and soil saturation are fundamental to the maintenance of wetland communities and affect every aspect of the lifecycle of an individual plant from germination, establishment, development and competitive interaction (van der Valk and Davis, 1978; van der Valk, 1981; Keedy, 1983; Keedy and Ellis, 1985). These processes differentiate wetlands from terrestrial or aquatic communities. In terrestrial environments, temperature is the common environmental stimulus for germination. In wetlands, inundation patterns also affect seed and seedling performance causing differential recruitment of flood-tolerant species from the seed banks (Wishue and Keedy, 1991; Peterson and Baldwin, 2000; Peterson and Baldwin, 2004; Casanova and Brooks, 2000). Once

established, the long-term survival of individuals is dependent upon the frequency, duration and amplitude of flooding (Riis and Haves, 2002), which destroys or excludes terrestrial species but allows wetland species adapted to these conditions to develop. Plant species that are specifically adapted to, or tolerant of saturation and inundation possess adaptations that enable them to survive under the conditions imposed by fluctuating water levels, soil saturation and changes in soil chemistry (Pezeshki, 2001; Otte, 2003). If the hydrological conditions are altered significantly, wetland plants are no longer specifically adapted to their environment, and loose their competitive edge over terrestrial species.

Variations in water levels also influence the balance between species within each habitat type. For example, part of the balance between two sedge species, greater fen sedge *(Cladium mariscus)* and tufted sedge (*Carex elata)*, both of which occur in similar situations, may relate to tolerance of short-term variation in water-levels. Some authors have suggested that *Cladium* is dominant where the water table remains more stable whereas *C. elata* is more common to sites with a variable water table (Haslam, 1965, Wheeler, 1975). *Cladium* grows best when the watertable remains between about 15cm below ground and 40cm above (Conway, 1942). Although it can tolerate short periods of drier conditions in summer, vigour is maintained only if the roots are submerged. The implications for abstraction are that an increased variability in water levels may adversely affect *Cladium* fen, a priority habitat occurring along Lough Ree and Lough Derg shores.

In addition, the hydrological regime influences other factors including nutrient status and management (Gilvear and Bradley, 2000). Therefore, alterations to the current hydrological regime could potentially produce a series of impacts that affect the composition and distribution of shoreline habitats.

Increase in Low Flow Duration

The abstraction of water from Lough Ree will result in a marginally reduced average flow downstream of Athlone but no reduction in the minimum specified flow rate. By manipulation of the flow controls currently in place at the weir in Athlone, the downstream flow pattern can be maintained close to its current state for most of the year. When based on the driest year (1995), the reduction in water flow downstream of Athlone is expected to result in the lengthening of the current low flow period where flows are maintained at $12m^3/s$. The regulation of the flow in the Shannon is controlled by the ESB Regulations seek to balance electricity generation, navigation and flood control requirements. The minimum flow of $12m^3/s$ downstream of Athlone is specified by regulations. Lower flows have the potential to impact negatively upon riverine habitats and species.

In England, numerous rivers have suffered negative impacts due to abstraction for drinking water supply, with abstractions reaching up to 60% of summer flows in some rivers (Willis & Garrod, 1998). Many studies have been carried out to assess the impact of low flows, which may be associated with abstraction, on the various elements of the ecology of riverine systems and to calculate the maximum abstraction volume permitted while maintaining healthy ecosystems. These studies have looked at the effects of low flows on macrophytes (Holmes, 1999), macroinvertebrates (Wood & Petts, 1999, Brunke

et al., 2001, Wright *et al*., 2004, Wills *et al*., 2006), fish, particularly salmonids, (Bonacci *et al*., 1998, Strevens, A.P. 1999, Gibbins & Acornley, 2000) and in-stream habitats (Wood *et al*., 1999, Brunke *et al*., 2001). Low flows can result in the drying out of spawning reeds, reduction in habitat available to juvenile and adult fish, reduction in riverbed available for macroinvertebrates, changes to in-stream and riparian macrophyte communities and changes to in-stream habitats.

The majority of these studies have shown that, while the ecological elements of rivers react to low flows in a number of ways including changes to plant communities, macroinvertebrate densities, fish densities and habitat, changes are usually short-term. In studies that investigated drought-induced low flows, the changes that resulted from the low flows were reversed with the increase in flows that followed the drought period (Holme, 1999, Wood & Petts, 1999). It has been found that low flow levels of up to 50% had no significant impact on macroinvertebrates (Wills *et al.,* 2006), while rule-of-thumb guidelines for maintaining water quality and habitats suggests 60-100% of the average flow should be maintained at all times (Tennant, 1976 in Gordan *et al*., 1992).

Much of the work that has been carried out on low flow effects on river habitats and species cannot be strictly applied in the case of the River Shannon between Athlone and Portumna. Low flows in most of the rivers and streams addressed in these studies resulted in a drop in water levels. This would not be the case in the River Shannon due to the various controls on the downstream flows at Athlone, Meelick and Parteen. A minimum flow of 12m^3/s is currently maintained downstream of Athlone and should abstraction occur, this discharge rate would continue. Modelling has shown that in late autumn the increase in water level that would usually occur at the beginning of October would be delayed for a number of days, should abstraction from Lough Ree take place, leading to a reduction in water levels relative to normal conditions.

In conditions of low flow, eroding habitats (riffles) are more prone to negative impact on macroinvertebrates than depositing habitats (Kraft, 1972 in Wills *et al*., 2006). In light of the prevailing riverine conditions in the River Shannon between Athlone and Portumna, and the limited diversity of its macroinvertebrate community, it is not expected that the macroinvertebrates will be negatively impacted upon by the lengthening of the low flow period. The high discharge rate in the winter period is likely to be the main factor influencing the habitats within the channel.

It has been reported that discharge can have an impact upon the timing of upstream spawning migration by salmonids, with high discharge volumes triggering migration or hastening the upstream movement and low discharges resulting in delayed upstream migration (Thorstad *et al*., 2005). While most studies have found that increases in water discharge stimulate upstream migration, this may be the result of underreporting of no effect findings (Thorstad *et al*., 2005). Also, it has also been found that migration is stimulated by an increase in discharge over the previous day rather than the absolute discharge rate.

Prolonging the low flow period downstream of Lough Ree has the effect of reducing the assimilative capacity of the river. This is most important in terms of the discharge of wastewater effluent into the river. In low flow conditions, the dilution capacity of the river is reduced, thus resulting in a higher concentration of effluent, in particular nutrients such as phosphorus. An increase in nutrient concentrations in the river would encourage plant and algal growth, which would alter the existing conditions in the river as well as having knock-on effects downstream in Lough Derg, by way of the inflowing waters of the Shannon having higher concentrations of nutrients. Nutrient levels in the inflowing water of a lake have been shown to be the most important parameter in describing the phosphorus levels in a lake, which contributes to phytoplankton growth (Brett & Benjamin, 2008). Excessive phytoplankton growth can lead to algal blooms occurring with the associated negative effects on water quality, ecology and recreational value of the waterbody. Algal blooms can also reduce transparency in the water column, which can limit the feeding potential for diving species.

The issue of low flows is limited to the section of the River Shannon between Lough Ree and Lough Derg. Any reduction in flows downstream of the Parteen Weir, south of Killaloe, can be compensated by redirecting water that would previously have passed down the headrace and through Ardnacrusha for power generation. This will maintain existing conditions in the River Shannon downstream of Parteen and thus continue to support the important habitats and species in this section of the river.

Changes to River Water Levels

The abstraction of water from Lough Ree, which would result in an increase in the number of low flow days between Athlone and Portumna, will also result in changes to the water levels in Lough Ree. Modelling of 1995 has shown that lower water levels will start earlier in the summer (in May) and last for longer in the autumn (into October), whereas levels will remain similar for much of the rest of the year. Consistent changes to the water levels of a river can have impacts upon the habitat, flora and fauna, of that river. A number of coarse fish spawn in the May-June period including bream, roach, rudd and perch. These fish attach their eggs to plants in shallow water and drops in water levels could lead to the loss of the eggs.

In relation to impacts on aquatic macrophytes, the lengthening of the low flow period has the potential to have a negative impact as the period of low lake levels will extend to earlier in May and later in October. The lower lake levels that would occur in May, with abstraction, as compared to the situation without abstraction are of most concern as this would be during the growing season when plants are most active. This impact may not be significant as the water levels in the section of the River Shannon between Lough Ree and Lough Derg show high variation throughout the year and the aquatic macrophyte communities consist of species that are generally adapted to fluctuating water levels.

The Shannon Callows have developed between the lakes of Lough Ree and Lough Derg along a wide and very slow-moving section of the River Shannon, which regularly floods to the edges of raised bogs and glacial esker ridges (Heery, 2003). The Shannon Callows and the Little Brosna Callows support

internationally and nationally important habitats such as, lowland hay meadows and Molinia meadows, and species including migratory wildfowl and waders. The annual flooding regime is fundamental to the development and maintenance of habitats that occur in this area.

The Shannon Callows typically flood every winter for long periods, often in autumn and spring and occasionally in summer (Heery, 1993). The timing of flood is largely unpredictable but generally begins between October to December and is generally flood free after April (Heery, 2003). As the plant communities are influenced by a combination of factors including spring flooding regime and grassland management (Heery, 2003), lower water levels in spring and early summer could potentially affect the distribution of species and land use on the Shannon Callows.

The spring period of March to May is an ecologically important period when grassland management begins, birds commence breeding and the plant species commence their growing season. In a study on the annual flooding patterns during the March, April, May period, the incidence of flooding between 1961-94 showed no consistent annual pattern as the timing and extent of flooding varied from year to year. Consistent dryer conditions at this time of year may encourage agricultural intensification (Heery, 1995) in the long-term as land becomes more accessible. Hay making on the callows has traditionally been later than in other areas of the country due to the wet conditions created by annual winter flooding (Heery, 1993). Earlier mowing resulting from dryer conditions would have serious consequences for the corncrake population, which requires a mean mowing date of at least 1st August (Green & William, 1994). More intensive land use resulting from dryer conditions in the spring/early summer would negatively affect the species diversity of plant communities and negatively impact on ground nesting birds such as corncrake and lapwing.

The Middle Shannon Callows has been designated, inter alia, for its important populations of breeding waders, including lapwing, redshank and snipe. The latter two in particular rely on damp conditions in the grasslands in spring and early summer, to enable them to probe the soft mud for invertebrates for feeding. A reduction in water levels resulting in less frequent flooding of adjacent wet grasslands could also result in poorer feeding for probing species that require soft ground.

Breeding waders have suffered severe declines across Western Europe in the last few decades (Beintema & Muskens, 1987, Donald et al., 2001, BirdLife International, 2004). Although declining (Tierney et al., 2002, the ShannonCallows population remains one of the most important in the country and conservation work is underway to ensure its protection and restoration (Lynch et al., 2007, Finnery et al., 2007). Any impact on conservation measures would constitute a significant adverse effect.

Many of the Annex I bird species and other significant species for which SPAs are designated are wintering waterfowl The callows support internationally important wintering waterfowl populations, especially whooper swan, Greenland white-fronted goose, golden plover and black-tailed godwit and nationally important numbers of several other species which are present during mid-winter. A

reduction in annual inundation patterns could adversely affect the condition of the site for these species. Although the models suggest that annual winter flooding will remain largely unchanged from the current regime, the effect of prolonged low flow at the beginning of autumn may lead to drier habitat conditions until much later in the season. This could lead to a significant adverse effect on the callows over time.

Considerable work has been carried out as part of the SNIFFER (Scotland and Northern Ireland Forum For Environmental Research) project in relation to defining river flows and lake levels necessary to achieve at least good status under the Water Framework Directive (for report see Acreman *et al*., 2006). This report sets out percentage allowable abstraction for the different river typologies for the protection of ecological elements. The percentage of the water that can be abstracted is related to the ecological component (fish, macrophytes and macroinvertebrates), existing discharge and time of year. Limited or no abstraction is allowed when levels reach "Hands Off Flows" (HOF), often taken to be when river flows drop below Q95 (the discharge which is present in the river at least 95% of the time). The recommended standards for abstraction for the maintenance of good ecological status are in the range of 15-35% of flow depending on time of year and natural discharge.

Changes to Groundwater levels

Changes in surface water levels in rivers and lakes can have an effect on adjacent groundwater levels. The source of groundwater recharge is through precipitation or surface water that percolates downward. The proportion of annual precipitation contributing to groundwater recharge is dependent on climate, land use, soil type, geology and other factors. Left untouched, groundwater naturally arrives at a balance, discharging and recharging depending on hydrologic conditions. A lowering of water levels in the main channel of a river resulting from prolonged periods of low flow could have a knock-on effect on groundwater levels in the vicinity of the channel. Groundwater dependent habitats could therefore be adversely affected and subjected to some degree of drying-out. Even minor alterations could have a significant effect depending on the sensitivity of the habitat and the geology of the site. When repeated annually over several decades this could cumulate into a significant effect. Each site has different hydrology and the individual hydrological pathways and connections are often unclear, creating a gap in knowledge regarding the potential impacts of the Plan.

The underlying impervious clay deposits effectively seal the callow soils from regional groundwater flow (Hooijer, 1996) however seepage of regional flow at the callows edge does occur, especially at the base of eskers (Heery, 2003). Groundwater-fed habitats are more susceptible to changes in the main channel where they are linked to the regional groundwater system and habitats that have fast groundwater connections such as swallow holes have greater potential for impact. Other groundwater-fed features such as seepage zones and springs are also vulnerable to changes in groundwater levels. These features are typically associated with turloughs and fens.

The development of storage areas for a number of options (E, F1, F2 and G) and an impoundment area (G) has the potential to have significant adverse impacts on the waterbodies within the midlands if waters are mixed. Current proposals are not based on mixing. Similarly the impoundment option does not propose to deliberately mix waters but great care would be required.

Increase in Lough Derg Retention Time

The abstraction of water from Lough Ree, which will result in lower volumes of water flowing downstream into Lough Derg, would increase retention time (also referred to as residence time) in Lough Derg, as does the abstraction of water from the north of Lough Derg. Retention time is the average length to time water stays in a lake. Retention time is variable throughout the year, with lower retention times generally found in the winter months when rainfall is high and higher volumes of water are flowing into and out of the waterbody in question. In summer months, when the volume of water flowing into the lake is reduced, then the retention time is greater (George *et al*., 2007). The current retention time in Lough Derg is 0.15 year (55 days). This retention time is an average value over the year. The retention time is considerably longer in the summer period when low flow conditions prevail. The period 30th April 2000 – 2nd October 2000 was modelled to illustrate changes to the retention time that would occur as a result of abstraction. The retention time was shown to increase from 123 days to 130 days.

Increasing the retention time of a waterbody can have a number of negative impacts upon water quality and aquatic ecology. These impacts relate mainly to reduced flushing of phytoplankton, which can lead to earlier algal blooms which last longer and have a higher biomass and also have a different species composition (Brook & Woodward, 1956, Jones & Elliott, 2007). Algal blooms can have negative impacts upon other elements of the ecology of a lake, such as reducing the penetration of light through the water column, which impacts negatively on photosynthesis and growth of submerged macrophytes, toxic effects and a reduction in dissolved oxygen though decomposition of the bloom, which impacts on fish and macroinvertebrates. Lakes with eutrophic conditions are also more suitable to introduced coarse fish such as roach, which compete with pollan and thus have a negative impact on this species of conservation importance (Rosell, 1997, Rosell *et al*., 2004). Alterations to lower levels of the food chain could have impacts further up the chain on bird species that are dependant on fish and macroinvertebrates. Diving species such as tufted duck could also be adversely affected by a decrease in water transparency.

Lough Derg has suffered from eutrophication over the last number of decades as levels of phosphorus in the water increased, moving the lake from an oligotrophic state in the early part of the last century to a highly eutrophic state in the mid-1990 (Bowman, 1996). High levels of phosphorus have contributed to high phytoplankton growth and the development of algal blooms. The current phytoplankton community is largely controlled by the levels of phosphorus although factors other than phosphorus are limiting plankton growth in Lough Derg during the summer moths (Bowman, 2000). Trophic status of the lake as measured by the chlorophyll *a* criterion is indicative of a borderline between oligotrophic

and mesotrophic conditions in the recent years (Bowman, 2000). This is thought to be a result of the grazing pressure imposed by the zebra mussel on phytoplankton, which maintains phytoplankton levels (and thus chlorophyll *a* levels) lower than would be expected given the current phosphorus levels within the lake (Toner *et al*., 2005).

The load of humic acids from extensive peatlands throughout the Shannon catchment has resulted in the water of Lough Derg being highly coloured, reducing light penetration to less than 2 metres in most areas. The biological response of the lakes with a high level of humic acids differs from that of clear lakes with the algal load of the coloured lakes being much lower. This is due to poorer light penetration and a high proportion of phosphorus bound to humic acids and as a result not being readily available for uptake by primary producers (Jackson & Hecky, 1980; Chow-Fraser & Duthie, 1983; Jones, 1990). Similar discrepancy between the trophic status as indicated by the levels phosphorus and chlorophyll *a* has been observed for Lough Allen (Bowman, 2000), which is free from zebra mussel in most of its reaches.

There is no doubt that the current situation with regard to eutrophication in Lough Derg is undesirable, and that measures are required to reduce the concentrations of phosphorus in the lake, which will have knock-on effects on the concentration of chlorophyll in the lake. These measures will need to combat inputs from point sources (waste water treatment plants, discharge from pleasure boats), as well as diffuse inputs (run-off from farmland). Considerable reductions and a long time period will be required to reduce the trophic status to that of oligotrophic, where it was at the beginning of the last century (Bowman, 1996).

Modelling work, which investigated the impact of increased retention time on lakes and reservoirs by means of reducing the inflow (as would be the case should abstraction occur in Lough Ree) suggests that responses of total chlorophyll and cyanobacteria abundance to longer retention times is small, especially where retention time is over 100 days, for modelled flows of a 20% reduction in the inflow (Elliott & Jones, 2006). A threshold of 20 days residence time has been identified below which phytoplankton communities suffer from washout in lakes. Lakes are likely to be sensitive to significant changes in the annual range and distribution of daily residence time, especially if changes affect its relationship to the 20 day threshold (Acreman *et al*., 2006). Brett & Benjamin (2008) showed that the concentration of total phosphorus in the inflowing water explained the majority of the total phosphorus concentration found in a lake, with retention time explaining only a small percentage.

Impingement and Entrainment of Fish

The abstraction of water from the Shannon System has the potential to impact negatively on the fish communities of the lakes by means of impingement or entrainment. Impingement refers to impacting of fish against the intake screen, drawn in by the intake current, while entrainment refers to fish being

drawn in past the screen and into the intake pipeline itself. Fish drawn into the water treatment plant would be killed in the treatment process.

Considerable work has been carried out on the impact of water intakes on fish populations of river, lakes and estuaries, particularly in relation to power stations, which require large volumes of water for cooling (Carter & Reader, 2000, Lewis & Seegert, 2000, Spicer *et al*., 2000, Barnthouse 2000, Hadderingh & Jager, 2002, Turnpenny 1988). At particular risk are fish eggs, larvae and young-of-year (YOY), which lack the ability to avoid the current once drawn in (Carter & Reader, 2000). The entrainment of fish generally shows a seasonal pattern with peak entrainment in the summer months (Kelso & Milburn, 1979 Carter & Reader, 2000). The ability of fish to avoid being drawn into a water intake depends on their swimming ability, often referred to as their maximum sustainable swimming speed (MSSS) in units of body length per second (Turnpenny *et al*., 1998). Salmonids, such as trout and salmon, show higher MMSS than coarse fish such as roach and dace (Turnpenny *et al*., 1998). Kelso & Milburn (1979) showed an exponential relationship between water abstraction volumes and impingement.

The location of the abstraction water intakes in Lough Ree or Lough Derg in the main poses a risk to the young of the lake dwelling fish, such as pollan, brown trout and many coarse fish species. Juvenile fish of many species utilise shallow waters as nursery areas where there is a reduced risk from predation by piscivorous fish. As a result placing the intake in shallow water would increase the likelihood of the entrainment and/or impingement of juvenile fish. Migrating fish, such as salmon, may be at risk if the migration route passes close to the intake location. However, the maximum swimming speed of salmon means that by the time they are migrating they are likely to be of sufficient size to escape any proposed intake current (Turnpenny *et al*., 1998).

The position of the intake in shallow water may impact upon pollan if the intake were located in or adjacent to pollan spawning grounds. The locations of pollan spawning grounds in Lough Ree and Lough Derg are unknown, and it is thought that spawning may also occur in the River Shannon channel between Lough Ree and Lough Derg (Anon, 2007).

In terms of the impact of entrainment and impingement on fish fry, the loss of a percentage of the population at this early stage of development is not equivalent to the loss of adult fish (Turnpenny *et al*., 1998), as most fish species show very high mortality at early life stages and losses may be balanced by the increased survival of remaining fish by density-dependant effects (Van Winkle, 1977, Branthouse, 2000).

Transfer of Invasive Species

The abstraction of water from the Shannon System has the potential to cause the spread of invasive species to other waterbodies, including to other European sites. Baseline information on the full list of

invasive species and their distributing is not currently available and there is no systematic monitoring for invasive species. A number of invasive species have been recorded in the Shannon, most notably the zebra mussel *Dreissena polymorpha*. Since its introduction it has spread throughout the Shannon System and to other waterbodies throughout Ireland, by means of vectors such as angling boats, angling gear, pleasure craft, etc (Rosell *et al*., 1999). The impact of the introduction of this species to the Shannon System has been dramatic, leading to a reduction in the levels of algal biomass in the water column due to their high filter-feeding capacity, the consequent increase in light penetration, fouling of water pipes and submerged structure, etc. Their ability to filter large volumes of water results in a depletion of food sources for native invertebrates and fish species, which changes the competitive interactions between species and alters the energy flow within the aquatic system from a pelagic to a benthic ecosystem. Zebra mussels invade fish spawning grounds by densely colonising gravel and stones used as spawning grounds, causing changes in fish population dynamics. They attach themselves to the outside of shells of native mussels such as the swan and duck mussels preventing them from opening and causing them to starve. They have also been shown to selectively filter out certain species of blue-green algae, which has sometimes contributed to *Microcystis* blooms, which produces toxic conditions and is a health hazard.

The transfer of other invasive species such as Nuttall's waterweed (*Elodea nuttallii*), which occurs in the Shannon system and the River Liffey, poses a potential threat to receiving waterbodies. The pumping of raw water from the Shannon System to another site has the potential for the introduction of invasive species to waterbodies where these species are not present, through water-mixing or accidental leakage from transmission pipelines.

Water fern (*Azolla filiculoides*) are free-floating plants that form thick layers, completely covering the surface of slow-moving water, reducing light levels so that submerged native plants die off causing serious oxygen loss. Water ferns have been found in the main channel of the River Barrow and in the Shannon system. However, within the Shannon system it occurs with a parasitic aphid that controls its spread (Caffery pers. comm.).

Other invasives that occur frequently in many river systems including the Shannon, the Barrow and the Liffey are giant hogweed (*Heracleum mantegazzianum*), Himalayan balsam (*Impatiens glandulifera*) and Japanese knotweed (*Fallopia japonica*).

While fish species are less likely to pass through filters or screens, there is still the potential for their spread. Dace is an introduced freshwater or brackish fish, which is exceedingly prolific, and poses a risk as a potential pest in some areas. Dace is present in the Barrow River and in the sub-catchments of the Shannon estuary.

The transfer of intercatchment water also increases the likelihood of facilitating the spread of future invasions. Curley leaved waterweed (*Lagarosiphon major*), which reproduces by fragmentation and is

easily spread, poses a serious threat to angling, recreation and the ecological integrity of waterbodies. It has not yet been identified in Lough Derg but is known to occur in a nearby. Similarly, New Zealand pigmyweed (*Crassula helmsii*), occurring in the Grand Canal could potentially find its way into the main Shannon system (Caffery, pers. comm.). If an invasion of Lough Derg were to occur, these species could be easily spread to other catchments. The movement of invasive species to other waterbodies, particularly those of European sites would constitute a significant adverse effect.

4.9.3.2 Desalination

The operation of a desalination plant has the potential to impact adversely on the marine environment, including habitats and species of adjacent European sites. These impacts relate mainly to the discharge of the brine produced as part of the desalination process, and also to the potential impact of the water intake.

Brine Solution Discharge

The principal by-product of the desalination process is concentrated seawater or brine solution. It is expected that the brine solution will have a salinity of twice that of the intake water (up to 69 g/l). The discharge of brine solution into the marine environment has the potential to impact upon the ecology of the area in a number of ways. These include the direct effect of the increased salinity around the discharge point, shading effects and alteration to hydrodynamics, as well as impacts from the other constituents that may be present in the brine such as coagulant ($FeCl_3$), antiscalant (P_2O_5) and suspended solids.

Two scenarios have been modelled for the discharge of the brine solution, with sludge dispersion and without sludge dispersion (**Table 4.10** and **Table 4.11**). The dispersion of sludge in the brine discharge would remove the requirement to treat the sludge and transport it for disposal and a landfill facility.

The differences in the characteristics of the brine discharge with and without sludge dispersion will be considered where appropriate.

Salinity

The salinity of the discharge remains the same in both the ‘with sludge dispersion’ and ‘without sludge dispersion’ scenarios.

The discharge of the concentrated brine solution will result in an increase in the salinity of the water in the vicinity of the outfall diffuser. Modelling of the dispersion of the high salinity discharge has shown that the initial mixing following release into the water column will result in a reduction in the salinity from 69 g/l to between 35.3 and 35.8 g/l depending on tidal conditions. The modelled diffuser

consisted of 10 ports of 0.4 m diameter at 10 m centres and the port exits discharging vertically. This initial dilution brings the salinity into the range found in natural marine conditions and one which fully marine species would be able to tolerate.

Antiscalant

The concentration of the antiscalant in the discharge remains the same in both the 'with sludge dispersion' and 'without sludge dispersion' scenarios.

The antiscalant Phosphonate (P_2O_5) is proposed for use in the desalination process. With sludge dispersion, the maximum concentration of the Phosphonate in the brine solution would be 300 µg/l. While phosphorus is required for algal growth, in the marine environment nitrogen is generally the limiting factor with phosphorus present at levels twice as high as can be used by algae (Ryther & Dunstan, 1971), though where coastal areas are influenced by freshwater discharges from river with low levels of phosphorus, phosphorus can become a limiting factor (Labry *et al*., 2002). The nearest major estuary to the brine outfall point is the Rogerstown Estuary, which is classified as eutrophic due to the high levels of nutrient present in the rivers and streams discharging into it. In light of this, it is expected that the discharge of the Phosphonate into the marine environment at the levels predicted will have no significant effect on the marine environment particularly in terms of phytoplankton and algal growth.

Suspended Solids – with Sludge Dispersion

The level of suspended solids released in the brine solution with sludge dispersion is up to 56 mg/l. The suspended solids released are those that were taken in with the water at the abstraction point. Dispersion modelling shows that the there would be a peak in suspended solids in the vicinity of the diffuser, but this would be rapidly diluted by the movement of the water column to levels below 1-2 mg/l. Compared to background levels of 161 mg/l recorded mid-water 1 km from the shore by sampling, carried out by RPS, this level of increase in suspended solids does not constitute a significant increase and would have no impact upon the marine environment.

Suspended Solids – without Sludge Dispersion

The level of suspended solids in the brine solution where sludge dispersion does not take place is less than 1 mg/l. The release of a discharge with this level of suspended solids into the marine environment will have no impact on marine ecology.

Coagulant – with Sludge Dispersion

The use of ferric chloride ($FeCl_3$) as a coagulant in combination with sludge dispersion would result in the brine discharge having an iron concentration of up to 57 mg/l. The results of dispersion modelling

shows that levels of iron in the immediate vicinity of the diffuser would reach a maximum of 2-3 mg/l, while average iron levels would be below 1 mg/l.

Recent work on the potential use of seeding the marine environment with iron to stimulate phytoplankton growth and thereby reduce levels of atmospheric CO_2 have shown that increasing the concentration of iron in seawater can result in increased growth of phytoplankton. In certain conditions this could result in the formation of algal blooms, which would impact negatively upon the marine environment and its flora and fauna. Given the position of the diffuser, within the Rockabill SPA and adjacent to the Skerries Islands SPA and Lambay Island SAC and SPA, the effect of algal blooms caused by the release of iron into the inshore environment is likely to be negative in terms of feeding birds and seals.

Coagulant – without Sludge Dispersion

Where sludge is not discharged with the brine solution there is no coagulant present in the discharge. Therefore there will be no impact.

Deoxygenation of Benthic Layer

The brine solution by-product of the desalination process to be discharged to the marine environment has the potential to impact upon the benthic habitat by causing the deoxygenation of the benthos. Brine solution is denser than seawater owing to its higher concentration of salt, which causes it to sink. If the hydromorphological conditions in the area where the brine solution is discharged do not encourage the mixing of the solution with seawater, which would result in its dilution, a layer of dense saline water can form on the seabed. Where mixing with the surrounding water does not occur, this layer would become deoxygenated, thus causing the death of benthic species.

It is proposed that the brine will be discharged though a diffuser with 10 ports of 0.4 m diameter at 10m centres and the port exits discharging vertically. This design, combined with the movement of tidal currents will ensure good mixing with the water column, which will minimise the potential for the deoxygenation of the benthic layer.

Entrainment/Impingement of Marine Organisms

The abstraction of water from the waters off the north Fingal coast has the potential to impact on the marine organisms living in the water column; either those who form a permanent part of the community or those whose larval stages live in the water column before settling out. The species impacted depend on the depth at which the water is abstracted. Close to the surface, in the euphotic zone (the upper layer of the water column that received enough light for phytoplankton to photosynthesise), the abundance of phytoplankton is at its highest. Phytoplankton forms the basis of the marine food chain, with zooplankton grazing on the phytoplankton and in turn being preyed upon

by larger organisms such as fish. This will ultimately have effects further up the food chain on birds and mammals.

Water currents generated by the abstraction of water can draw in organisms that are not sufficiently powerful swimmers to escape the current, causing them to impact upon the screen (impingement) or be carried into the desalination system (entrainment). Impingement often caused damage to the organism, which may lead to death, while the entrainment of organisms will usually be lethal owing to the operation of the desalination system.

The removal of phytoplankton and zooplankton from an area of the water column leads to a reduction in the food resources available to grazers and predators. The entrainment or impingement of small fish or fish larvae may impact upon the population of that species. The populations of benthic organisms, which have a planktonic larval stage (e.g. many crustaceans, such as crabs and lobsters, worms, starfish, etc) may also be impacted upon by the impingement and entrainment of larvae by the abstraction pipeline.

By careful location and design of the water intake, the potential for a significant adverse effect caused by entrainment and impingement has been greatly reduced. The intake of plankton and fish into the desalination process is undesirable from an engineering point of view as well as an ecological one. In order to minimise this, the intake velocity will be low (less than 0.25 m/s) and the intake will be located below the surface layer, where the majority of plankton resides.

4.10 APPROPRIATE ASSESSMENT

There is frequently an overlap in European site designations with some sites, such as Lough Ree, designated as both SAC and SPA. In order to avoid repetition in the following text, the Appropriate Assessment for Option A-H is carried out with the full list of screened European sites.

4.10.1.1 Option A- Lough Ree

Lough Funshinagh SAC

The hydrological connection between Lough Funshinagh and Lough Ree is unclear. Permanently wet areas could be susceptible to drying out if water levels are altered. Further investigation of the hydrological connection is required.

Lough Ree SAC/SPA

The result of the hydrological modelling of the Shannon Catchment shows that the abstraction of 350 ml/d water from Lough Ree will result in a drop in water levels as compared with the current situation,

particularly in the late summer – autumn period, but also in May. Littoral and riparian habitats and communities are sensitive to fluctuations in water levels outside the normal range, which can result in the loss of species of flora and fauna. The littoral zone of a lake is of great importance in terms of biodiversity and ecosystem function, providing substratum for aquatic plants, habitat for macroinvertebrates, spawning and nursery grounds for fish, amongst other services.

On shallow sloping shores where vegetation zonations are elongated, a prolonged interval of lower water levels would result in the vegetation along the upper slopes drying out more than usual under normal water levels. Over time, this could result in either a contraction of the vegetation zone or a shift in the location of the zone. Qualifying interests for nature designations with high sensitivity to changes in hydrological regime such as the alkaline fen, which occur adjacent to the lakeshore would be affected. The extended periods of low flow could also be significant from the point of view of seedling recruitment and competition. Shoreline communities that experience prolonged periods of low soil moisture levels and drying out early in the growing season may become invaded by more competitive species that are intolerant of wet conditions and that were previously precluded by the higher water levels.

The drop in water level as predicted is under optimum manipulation of the flow controls at Athlone. Therefore, under actual operating conditions, the controls are likely to be operated sub-optimally, resulting in a greater fluctuation in water levels. This impact is considered to constitute a likely significant adverse impact on the Lough Ree site.

Corbo Bog SAC

The hydrological connection between Corbo Bog and Lough Ree is unclear. Corbo Bog supports some groundwater dependent habitats that have some potential to be impacted upon. Further investigation of the hydrological connection is required.

Fortwilliam Turlough SAC

The hydrological connection between Fortwilliam Turlough and Lough Ree is unclear. There is some potential for impacts were the groundwater dependent habitats in Fortwilliam Turlough are connected to the regional watertable. Further investigation of the hydrological connection is required.

River Shannon Callows SAC and Middle Shannon Callows SPA

The hydrological modelling of the flow in the River Shannon downstream of Athlone shows that abstraction of 350 Ml/d from Lough Ree will result in an increase in the low flow duration from 46 days to 70 days (1995 as driest year). This increase in low flows could have a number of adverse effects on the River Shannon as it flows through the Callows and Lough Derg downstream. A reduction in the

flow reduces the assimilative capacity of the river in relation to effluent discharged into it, particularly from the Athlone wastewater treatment plant. This will result in an increase in the concentration of nutrients in the River Shannon, which will have implications for eutrophication of the river, resulting in increased algal and macrophyte growth. An increase in algal and macrophyte growth would impact adversely on the feeding of birds, particularly diving species such as tufted duck. Where lands are periodically inundated by nutrient enriched water, the soil fertility will be increased. Over time this will reduce the species diversity of species rich habitats. The increase in the concentration of nutrients, such as phosphorus, in the river will have knock-on effects on water quality in Lough Derg downstream. This is discussed later on in this section under Lough Derg, North-East Shore.

While the increase in low flow days will not result in a drop in water level below that maintained by the 12m^3/s minimum flow, it will, however, result in the water level associated with that low discharge being reached earlier in the year and extending longer into the autumn period. This drop in water level from the existing situation could have impacts on aquatic macrophytes and spawning of coarse fish in particular. Consistently lower levels in spring could also result in some changes in land use and a tendency towards more intensive use, which would negatively impact on wetland habitats within the floodplains. A change in land use would in turn impact on ground nesting bird species such as corncrake and lapwing. The impact of the increased low flow period is considered to constitute a significant adverse impact on the River Shannon Callows.

River Suck Callows SPA

The River Suck is connected to the main channel of the River Shannon and could experience similar changes in land use as a result of the increase in low flow days.

River Little Brosna Callows SPA

The River Little Brosna is connected to the main channel of the River Shannon and could experience similar changes in land use as a result of the increase in low flow days.

Fin Lough (Offaly) SAC

There is limited information available regarding the hydrology of the site (NPWS, 2005). However, it is known that Fin Lough is supplied with lime-rich water from the surrounding eskers (Tubridy, 1984), which are adjacent to the River Shannon. Therefore groundwater dependent habitats, such as alkaline fen, are potentially susceptible to changes in levels in the River Shannon. Further investigation of the hydrological connection and potential impacts is required.

Lough Forbes Complex SAC

The water levels upstream of Tarmonbarry are controlled by sluice gates and therefore there will be no drop in levels in the Lough Forbes complex.

Lower River Shannon SAC

Considerable work has been carried out in assessing the effects of reducing downstream flows in the river on ecological elements including habitats, macrophytes, macroinvertebrates and fish as discussed in the potential impact section see **Section 4.9**. Any abstraction from the Shannon should be done without significant change to the hydrological regime on the Lower Shannon to prevent adverse impacts on habitats and species dependant on the current regime.

River Shannon and River Fergus Estuaries SPA

As there will be no significant changes to the volume or composition of water entering the estuaries, no significant adverse effect is likely to occur in this site.

Cloonmoylan Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Barroughter Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Redwood Bog SAC

There is some limited potential for impact on Redwood Bog cSAC as a result of alterations in water levels in the River Shannon however significant negative effects are unlikely. Further investigation of the hydrological connection is required.

All Saints Bog and Esker SAC/SPA

There is some limited potential for impact on All Saints and Esker SAC/SPA as a result of alterations in water levels in the River Shannon however significant negative effects are unlikely. Further investigation of the hydrological connection is required.

Mongan Bog SAC/SPA

There is some limited potential for impact on Mongan Bog SAC/SPA as a result of alterations in water levels in the River Shannon however significant negative effects are unlikely. Further investigation of the hydrological connection is required.

Kilcarren-Firville Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Liskeenan Fen SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Lough Derg, North-East Shore SAC and Lough Derg SPA

The reduced volume of water flowing into Lough Derg will result in an increase in the residence time within the lake. This, combined with the likely increase in nutrient concentration, may result in an increase in the nutrient levels in the lough and may also lead to an increase in phytoplankton growth. The exact effect of increased residence time and nutrients on phytoplankton dynamics is complicated by the presence of zebra mussels in Lough Derg. Grazing pressure exerted by the mussels on the phytoplankton crop of the lake already maintains the Chlorophyll A levels below that which would be expected at the present phosphorus levels, indicated by the fact that phosphorus levels have been shown not to drop during the algal growing season (Bowman, 2000). Therefore, an increase in phosphorus may well not have as dramatic an effect on the lake in terms of phytoplankton growth as may otherwise be expected. In light of this, the increase in residence time alone can be considered the principal source of possible effects on Lough Derg from the abstraction from Lough Ree.

The relative increase in residence time related to this option is small and is not expected to result in a significant increase in phytoplankton growth.

Table 4.12 provides a summary of the appropriate assessment for the European Sites potentially affected by Option A.

Table 4.12 Option A - Appropriate Assessment for the European Sites

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
Lough Funshingh SAC (8)	Lake nutrient levels and hydrological regime	Reduction in water levels	Yes. Some risk. Requires further investigation.	Same as Lough Ree (11)	Yes
Lough Ree SAC (11), Lough Ree SPA (3)	Lake nutrient levels and hydrological regime	Reduction in water levels	Yes. Modelling has shown a drop in water levels in the lake in the early summer and in the late-summer/autumn period. This has the potential to impact negatively on littoral and riparian habitats and species.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity. The planned abstraction of 41Ml/d from Killinure Lough could increase the impact of abstracting water from Lough Ree.	Yes
Corbo Bog SAC (12)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	Yes. Some risk. Requires further investigation.	Same as Lough Ree (11)	Yes
Fortwilliam Turlough SAC (13)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	Yes. Some risk. Requires further investigation.	Same as Lough Ree (11)	Yes
River Shannon Callows SAC (14) Middle Shannon Callows SPA (2)	River nutrient levels and hydrological regime	Increase in low flow duration	Yes. Increasing the low flow duration will result in an increase in nutrient concentrations due to a reduced dilution capability (assimilative capacity) of the River Shannon, in particular for effluent from Athlone WWTP. This would result in eutrophication issues for the River Shannon and Lough Derg downstream. Increased low flow duration also has implication for water dependant wetland habitats and species throughout the Shannon Callows	Same as Lough Ree (11)	Yes
River Suck Callows SPA (1)	River nutrient levels and hydrological regime	Increase in low flow duration	Yes. Increased low flow duration has implication for wetland habitats and species within the site.	Same as Lough Ree (11)	Yes
River	River	Increase in	Yes. Increased low flow	Same as Lough Ree	Yes

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
Little Brosna Callows SPA (33)	nutrient levels and hydrological regime	low flow duration	duration has implication for wetland habitats and species within the site.	(11)	
Fin Lough (Offaly) SAC (15)	Lake nutrient levels and hydrological regime	Reduction in water levels	Yes. Some risk. Requires further investigation.	Same as Lough Ree (11)	Yes
Lough Forbes Complex SAC (23)	Lake nutrient levels and hydrological regime	Reduction in water levels	No. Abstraction of water downstream will have no impact on water levels in the lake complex.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No
Lower River Shannon (65)	Hydrological regime	Reduction in discharge	No. No Significant changes to current hydrology of the Lower River Shannon downstream of Parteen Weir due to abstraction as long as regime is not changed.	Same as Lough Ree (11)	No
River Shannon and River Fergus Estuaries SPA (29)	Water quality, salinity and hydrological regime	Reduction in discharge	No. No changes in volume or composition of water entering the estuaries.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No
Cloonmoylan Bog SAC (78)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity, which should have positive effects on groundwater dependant habitats.	No
Barroughter Bog SPA (79)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	As outlined for Cloonmoylan Bog (78)	No
Lough Derg, North East Shore SAC (80), Lough	Lake nutrient levels and hydrological regime	Increase in residence time and associated effects on phytoplankton and	Yes. Reduced water flow into Lough Derg (with higher concentration of nutrients) will lead to an increase in residence time, which may impact significantly on nutrient	As outlined for Lough Ree (11)	No

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
Derg SPA (31)		nutrient dynamics	levels and consequently on the phytoplankton community of Lough Derg.		
Redwood Bog SAC (82)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	Yes. Some risk. Requires further investigation.	As outlined for Cloonmoylan Bog (78)	No
All Saints Bog and Esker SAC (83), All Saints Bog SPA (34)	Climatic conditions, nutrient levels, geological and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	Yes. Some risk. Requires further investigation.	As outlined for Cloonmoylan Bog (78)	No
Mongan Bog SAC (16) SPA (4)	Climatic conditions, nutrient levels, geological and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	Yes. Some risk. Requires further investigation.	As outlined for Cloonmoylan Bog (78)	No
Kilcarren-Firville Bog (86)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	As outlined for Cloonmoylan Bog (78)	No
Liskeenan Fen (87)	Nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	As outlined for Cloonmoylan Bog (78)	No

4.10.1.2 Option B-Lough Derg

Lough Ree SAC/SPA

As the abstraction is downstream of Lough Ree, no significant adverse effect is likely to occur in this site.

River Shannon Callows SAC and Middle Shannon Callows SPA

As the abstraction is downstream of the River Shannon Callows, no significant adverse effect is likely to occur in this site.

River Suck Callows SPA

As the abstraction is downstream of the River Suck Callows, no significant adverse effect is likely to occur in this site.

River Little Brosna Callows SPA

As the abstraction is downstream of the River Suck Callows, no significant adverse effect is likely to occur in this site.

Fin Lough (Offaly) SAC

As the abstraction is downstream of Fin Lough, no significant adverse effect is likely to occur in this site.

Lough Forbes Complex SAC

As the abstraction is downstream of the Lough Forbes Complex, no significant adverse effect is likely to occur in this site.

Lough Derg, North-East Shore SAC and Lough Derg SPA

The abstraction of 350Ml/day from Lough Derg will not have the same effect as abstraction from Lough Ree. The potential adverse impact on Lough Derg as a result of abstraction from Lough Ree relates to the reduction in flow into Lough Derg resulting in an increase in residence time and the increase in the concentration of nutrients in the inflowing water. With the abstraction of water from Lough Derg, the existing flow into the lake is maintained, and at the current concentration of nutrients. Brett & Benjamin (2008) showed that the concentration of total phosphorus in the inflowing water explained the majority of the total phosphorus concentration found in a lake, with residence time explaining a small percentage. In Lough Derg, this is complicated by the presence of the zebra mussel, which exerts sufficient grazing pressure on phytoplankton to generally prevent phosphorus becoming a limiting factor in phytoplankton growth (Bowman, 2000), which may increase the importance of residence time in controlling phytoplankton growth. The relative increase in residence time related to this option is small and is not expected to result in a significant increase in phytoplankton growth.

In addition to the current input of nutrients being maintained, the abstraction of water will also result in the abstraction of nutrients and phytoplankton, which further reduces any impact on the lake as compared to Option A.

The water level in Lough Derg is strictly controlled for the purposes of electricity generation at Ardnacrusha. The abstraction of water from Lough Derg will not result in a reduction in the water levels of the lake as the operation of the Parteen Weir controls the lake level and therefore the current levels can be maintained. Based on this, the abstraction of water from Lough Derg is not considered likely to cause a significant adverse effect on the site.

Lower River Shannon SAC

Considerable work has been carried out in assessing the effects of reducing downstream flows in the river on ecological elements including habitats, macrophytes, macroinvertebrates and fish as discussed in the potential impact section see **Section 4.9**. Any abstraction from the Shannon will be done without significant change to the hydrological regime of the Lower Shannon to prevent adverse impacts on habitats and species dependant on current regimes.

River Shannon and River Fergus Estuaries SPA

As there will be no significant changes to the volume or composition of water entering the estuaries, no significant adverse effect is likely to occur in this site.

Redwood Bog SAC

As the abstraction is downstream of Redwood Bog, no significant adverse effect is likely to occur in this site.

All Saints Bog and Esker SAC and All Saints Bog SPA

As the abstraction is downstream of All Saints Bog and Esker, no significant adverse effect is likely to occur in this site.

Mongan Bog SAC/SPA

As the abstraction is downstream of Mongan Bog, no significant adverse effect is likely to occur in this site.

Cloonmoylan Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Barroughter Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Kilcarren-Firville Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Liskeenan Fen SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Table 4.13 provides an overview of the appropriate assessment for the sites potentially affected by Option B.

Table 4.13 Option B - Appropriate Assessment for the European Sites

European Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
Lough Ree SAC (11), Lough Ree SPA (3)	Lake nutrient levels and hydrological regime	Reduction in water levels	No. Abstraction downstream will have no impact on levels in Lough Ree	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity. The planned abstraction of 41Ml/d from Killinure Lough is for use within the catchment and will not reduce the volume of water flowing from Lough Ree into Lough Derg.	No
River Shannon Callows SAC (14) Middle Shannon Callows SPA (2)	River nutrient levels and hydrological regime	Alteration to flows and levels	No. Abstraction downstream will have no impact on the hydrology of the site.	Same as for Lough Ree (11)	No
River Suck Callows SPA (1)	River nutrient levels and hydrological regime	Alteration to flows and levels	No. Abstraction downstream will have no impact on the hydrology of the site.	Same as for Lough Ree (11)	No
River Little Brosna Callows SPA (33)	River nutrient levels and hydrological regime	Alteration to flows and levels	No. Abstraction downstream will have no impact on the hydrology of the site.	Same as for Lough Ree (11)	No
Fin Lough (Offaly) SAC (15)	Lake nutrient levels and hydrological regime	Reduction in water levels	No. Abstraction downstream will have no impact on the hydrology of the site.	Same as for Lough Ree (11)	No
Lough Forbes Complex SAC (23)	Lake nutrient levels and hydrological regime	Reduction in water levels	No. Abstraction of water downstream will have no impact on water levels in the lake complex.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No
Lower River Shannon SAC (65)	Hydrological regime	Reduction in discharge.	No. No significant changes to the current hydrology of the Lower River Shannon, down stream of Parteen Weir, due to abstraction as long as regime is not changed.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity. There is a planned abstraction of 41Ml/d from Killinure Lough.	No
River Shannon and River	Water quality, salinity and	Reduction in discharge.	No. No changes in volume or composition of	The majority of the plans and projects identified are aimed at improving	No

European Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
Fergus Estuaries SPA (29)	hydrological regime		water entering the estuaries.	the water quality of water bodies and protecting biodiversity.	
Cloonm-oylan Bog SAC (78)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity, which should have positive effects on groundwater dependant habitats.	No
Barroughter Bog SAC (79)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	As outlined for Cloonmoylan Bog (78)	No
Lough Derg, North East Shore SAC (80), Lough Derg SPA (31)	Lake nutrient levels and hydrological regime	Increase in residence time and associated effects on phytoplankton and nutrient dynamics and reduction in water levels.	No. The increase in residence time is not large and abstraction of water from Lough Derg will also remove associated phosphorus thereby not increasing the concentration. The water level regime will be maintained within current range.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity. There is a planned abstraction of 41Ml/d from Killinure Lough.	No
Redwood Bog SAC (82)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. Abstraction downstream will have no impact on the hydrology of the site.	As outlined for Cloonmoylan Bog (78)	No
All Saints Bog and Esker SAC (83) All Saints Bog SPA (34)	Climatic conditions, nutrient levels, geological and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. Abstraction downstream will have no impact on the hydrology of the site.	As outlined for Cloonmoylan Bog (78)	No
Mongan Bog SAC (16) SPA (4)	Climatic conditions, nutrient levels, geological and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. Abstraction downstream will have no impact on the hydrology of the site.	As outlined for Cloonmoylan Bog (78)	No
Kilcarren-	Climatic	Changes in	No. No changes	As outlined for	No

European Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
Firville Bog SAC (86)	conditions, nutrient levels and hydrological conditions	groundwater arising from changes in surface water hydrology.	to water levels in Lough Derg.	Cloonmoylan Bog (78)	
Liskeenan Fen SAC (87)	Nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	As outlined for Cloonmoylan Bog (78)	No

4.10.1.3 Option C – Parteen Basin

Lough Ree SAC/SPA

As the abstraction is downstream of Lough Ree, no significant adverse effect is likely to occur in this site.

River Shannon Callows SAC and Middle Shannon Callows SPA

As the abstraction is downstream of the River Shannon Callows, no significant adverse effect is likely to occur in this site.

River Suck Callows SPA

As the abstraction is downstream of the River Suck Callows, no significant adverse effect is likely to occur in this site.

River Little Brosna Callows SPA

As the abstraction is downstream of the River Little Brosna Callows, no significant adverse effect is likely to occur in this site.

Fin Lough (Offaly) SAC

As the abstraction is downstream of Fin Lough, no significant adverse effect is likely to occur in this site.

Lough Forbes Complex SAC

The water levels upstream of Tarmonbarry are controlled by sluice gates and therefore there will be no drop in levels in the Lough Forbes complex.

Lough Derg, North-East Shore SAC and Lough Derg SPA

The abstraction of water at the Parteen Weir, downstream of Killaloe, will have no impact on residence time in Lough Derg. Therefore there will be no significant adverse effect on the site. The potential of loss to protected fish species populations that migrate past the abstraction point through impingement and/or entrainment is unlikely to constitute a significant adverse impact, as appropriate design at an early stage can address this issue.

Lower River Shannon SAC

Considerable work has been carried out in assessing the effects of reducing downstream flows in the river on ecological elements including habitats, macrophytes, macroinvertebrates and fish as discussed in the potential impact section see **Section 4.9**. Any abstraction from the Shannon should be done without significant change to the hydrological regime on the Lower Shannon to prevent adverse impacts on habitats and species dependant on the current regime.

Table 4.14 Option C - Appropriate Assessment for the European Sites

European Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
Lough Ree SAC (11) Lough Ree SPA (3)	Lake nutrient levels and hydrological regime	Reduction in water levels	No. Abstraction downstream will have no impact on levels in Lough Ree	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity. The planned abstraction of 41Ml/d from Killinure Lough is for use within the catchment and will not reduce the volume of water flowing from Lough Ree into Lough Derg.	No
River Shannon Callows SAC (14) Middle Shannon Callows SPA (2)	River nutrient levels and hydrological regime	Alteration to flows and levels	No. Abstraction downstream will have no impact on the hydrology of the site.	Same as Lough Ree (11)	No
River Suck	River nutrient levels and	Reduction in water levels	No. Abstraction downstream will	Same as Lough Ree (11)	No

European Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
Callows SPA (1)	hydrological regime		have no impact on the hydrology of the site.		
River Little Brosna Callows SPA (33)	River nutrient levels and hydrological regime	Alteration to flows and levels	No. Abstraction downstream will have no impact on the hydrology of the site.	Same as Lough Ree (11)	No
Fin Lough (Offaly) SAC (15)	Lake nutrient levels and hydrological regime	Reduction in water levels	No. Abstraction downstream will have no impact on the hydrology of the site.	Same as for Lough Ree (11)	No
Lough Forbes Complex SAC (23)	Lake nutrient levels and hydrological regime	Reduction in water levels	No. Abstraction of water downstream will have no impact on water levels in the lake complex.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No
Lough Derg, North East Shore SAC (80) Lough Derg SPA (31)	Lake nutrient levels and hydrological regime	Decrease in residence time and associated effects on phytoplankton and nutrient dynamics and reduction in water levels.	No. Abstraction of water occurs downstream of the lough and water levels and residence time will be maintained	Same as Lough Ree (11)	No
Lower River Shannon SAC (65)	Hydrological regime	Reduction in discharge.	No. No significant changes to the current hydrology of the Lower River Shannon, down stream of Parteen Weir, due to abstraction as long as regime is not changed.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity. There is a planned abstraction of 41Ml/d from Killinure Lough.	No
River Shannon and River Fergus Estuaries SPA (29)	Water quality, salinity and hydrological regime	Reduction in discharge	No. No changes in composition of water entering the estuaries.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No

4.10.1.4 Option D – Lough Ree and Lough Derg

This option includes phased abstraction from Lough Ree (250Mld) and Lough Derg (100 Mld). The abstraction is similar in nature to Option A, but the principal difference is that the continuous abstraction of 350Mld (Option A) has been reduced to 250Mld for Lough Ree under Option D. The effects of this option on the protected sites would be similar to those addressed for Option A and

Option B and have been reiterated in the following text. The likelihood that abstraction of water from Lough Ree would result in significant adverse effects on European sites and conservation objectives cannot be ruled out.

Lough Funshinagh SAC

The hydrological connection between Lough Funshinagh and Lough Ree is unclear. Permanently wet areas could be susceptible to drying out if water levels are altered. Further investigation of the hydrological connection is required.

Lough Ree SAC/SPA

The result of the hydrological modelling of the Shannon Catchment shows that the abstraction of 250 Ml/d water from Lough Ree will result in a drop in water levels as compared with the current situation, particularly in the late summer – autumn period, but also in May. Littoral and riparian habitats and communities are sensitive to fluctuations in water levels outside the normal range, which can result in the loss of species of flora and fauna. The littoral zone of a lake is of great importance in terms of biodiversity and ecosystem function, providing substratum for aquatic plants, habitat for macroinvertebrates, spawning and nursery grounds for fish, amongst other services.

On shallow sloping shores where vegetation zonations are elongated, a prolonged interval of lower water levels would result in the vegetation along the upper slopes drying out more than usual under normal water levels. Over time, this could result in either a contraction of the vegetation zone or a shift in the location of the zone. Qualifying interests for nature designations with high sensitivity to changes in hydrological regime such as the alkaline fen, which occur adjacent to the lakeshore, would be affected. The extended periods of low flow could also be significant from the point of view of seedling recruitment and competition. Shoreline communities that experience prolonged periods of low soil moisture levels and drying out early in the growing season may become invaded by more competitive species that are intolerant of wet conditions and that were previously precluded by the higher water levels.

The drop in water level as predicted will be under optimum manipulation of the flow controls at Athlone. Therefore, under actual operating conditions, the controls are likely to be operated sub-optimally, resulting in a greater fluctuation in water levels. This impact is considered to constitute a likely significant adverse impact on the Lough Ree site. While the likelihood of an adverse impact on the functional integrity of Lough Ree SAC/SPA would be less pronounced than that of Option A, it is still considered significant.

Corbo Bog SAC

The hydrological connection between Corbo Bog and Lough Ree is unclear. Corbo Bog supports some groundwater dependent habitats that have some potential to be impacted upon. Further investigation of the hydrological connection is required.

Fortwilliam Turlough SAC

The hydrological connection between Fortwilliam Turlough and Lough Ree is unclear. There is some potential for impacts were the groundwater dependent habitats in Fortwilliam Turlough are connected to the regional water table. Further investigation of the hydrological connection is required.

River Shannon Callows SAC and Middle Shannon Callows SPA

The hydrological modelling of the flow in the River Shannon downstream of Athlone shows that abstraction of 250 Ml/d from Lough Ree will result in an increase in the low flow duration in Lough Ree from 46 days to 63 days (1995 as driest year). This increase in low flows could have a number of adverse effects on the River Shannon as it flows through the Callows and Lough Derg downstream. A reduction in the flow reduces the assimilative capacity of the river in relation to effluent discharged into it, particularly from the Athlone wastewater treatment plant. This will result in an increase in the concentration of nutrients in the River Shannon, which will have implications for eutrophication of the river, resulting in increased algal and macrophyte growth. An increase in algal and macrophyte growth would impact adversely on the feeding of birds, particularly diving species such as tufted duck. Where lands are periodically inundated by nutrient enriched water, the soil fertility will be increased. Over time this will reduce the species diversity of affected habitats. The increase in the concentration of nutrients, such as phosphorus, in the river will have knock-on effects on water quality in Lough Derg downstream. This is discussed later on in this section under Lough Derg, North-East Shore.

While the increase in low flow days will not result in a drop in water level below that maintained by the 12m^3/s minimum flow, it will, however, result in the water level associated with that low discharge being reached earlier in the year and extending longer into the autumn period. This drop in water level from the existing situation could have impacts on aquatic macrophytes and spawning of coarse fish in particular. Consistently lower levels in spring could also result in some changes in land use and a tendency towards more intensive use, which would negatively impact on wetland habitats within the floodplains. A change in land use would in turn impact on ground nesting bird species such as corncrake and lapwing. While less pronounced than Option A, the impact of the increased low flow period is considered to constitute a significant adverse impact on the River Shannon Callows.

River Suck Callows SPA

The River Suck is connected to the main channel of the River Shannon and could experience similar changes in land use as a result of the increase in low flow days.

River Little Brosna Callows SPA

The River Little Brosna is connected to the main channel of the River Shannon and could experience similar changes in land use as a result of the increase in low flow days.

Fin Lough (Offaly) SAC

There is limited information available regarding the hydrology of the site (NPWS, 2005). However, it is known that Fin Lough is supplied with lime-rich water from the surrounding eskers (Tubridy, 1984), which are adjacent to the River Shannon. Groundwater dependent habitats, such as alkaline fen, could be susceptible to changes in levels in the River Shannon. Further investigation of the hydrological connection and potential impacts is required.

Lough Forbes Complex SAC

The water levels upstream of Tarmonbarry are controlled by sluice gates and therefore there will be no drop in levels in the Lough Forbes complex.

Lower River Shannon SAC

Considerable work has been carried out in assessing the effects of reducing downstream flows in the river on ecological elements including habitats, macrophytes, macroinvertebrates and fish as discussed in the potential impact section see **Section 4.9**. Any abstraction from the Shannon should be done without significant change to the hydrological regime on the Lower Shannon to prevent adverse impacts on habitats and species dependant on the current regime.

River Shannon and River Fergus Estuaries SPA

As there will be no significant changes to the volume or composition of water entering the estuaries, no significant adverse effect is likely to occur in this site.

Cloonmoylan Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Barroughter Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Redwood Bog SAC

There is some limited potential for impact on Redwood Bog cSAC as a result of alterations in water levels in the River Shannon however significant negative effects are unlikely. Further investigation of the hydrological connection is required.

All Saints Bog and Esker SAC/SPA

There is some limited potential for impact on All Saints and Esker SAC/SPA as a result of alterations in water levels in the River Shannon however significant negative effects are unlikely. Further investigation of the hydrological connection is required.

Mongan Bog SAC/SPA

There is some limited potential for impact on Mongan Bog SAC/SPA as a result of alterations in water levels in the River Shannon however significant negative effects are unlikely. Further investigation of the hydrological connection is required.

Kilcarren-Firville Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Liskeenan Fen SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Lough Derg, North-East Shore SAC and Lough Derg SPA

The water level in Lough Derg is strictly controlled for the purposes of generating electricity at Ardnacrusha. The abstraction of water from Lough Derg will not result in a reduction in the water levels of the lake as the operation of the Parteen Weir controls the lake level and therefore the current levels can be maintained. The potential adverse impact on Lough Derg as a result of abstraction from both

Lough Ree and Lough Derg relates to the reduction in flow into Lough Derg resulting in an increase in residence time and the increase in the concentration of nutrients in the inflowing water.

While the concentration of the nutrients in the water flowing into Lough Derg could potentially be elevated as compared to a no abstraction scenario, the volume of water discharging into the lake would be lower. Thus the total volume of nutrients discharge into Lough Derg from the Shannon would remain unchanged. While the higher concentration of nutrients could have an adverse effect on the water quality, this should be localised and confined to the area adjacent to the extraction point and this effect is not expected to occur in the remaining parts of the lake, where the river water is mixed within the lake and the concentration of the nutrients diluted to ambient levels. In addition to the current input of nutrients being maintained, the abstraction of water will also result in the abstraction of nutrients and phytoplankton, which reduces any impact on the lake as compared to Option A.

Brett & Benjamin (2008) showed that the concentration of total phosphorus in the inflowing water explained the majority of the total phosphorus concentration found in a lake, with residence time explaining a small percentage. The presence of zebra mussel exerts some uncertainty through obscuring the nutrient dynamics in the lake. Zebra mussels impose sufficient grazing pressure on phytoplankton to prevent phosphorus becoming a limiting factor in phytoplankton growth over certain times of the year (Bowman, 2000), which may increase the importance of residence time in controlling phytoplankton growth. The abstraction of 100Ml/day from Lough Derg and lower inflow of water to the lake from the Shannon will increase the residence time. However, the relative increase in residence time related to this option is small and is not expected to result in a significant increase in phytoplankton growth.

Based on the above, the combined abstraction of water from Lough Ree and Lough Derg is not considered likely to cause a significant adverse effect on the site. The increase in residence time is not large and therefore is not expected to have a significant effect on phytoplankton growth. The water level regime will be maintained within the current range.

Table 4.15 Option D - Appropriate Assessment for the European Sites

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
Lough Funshingh SAC (8)	Lake nutrient levels and hydrological regime	Reduction in water levels	Yes. Some risk. Requires further investigation.	Same as Lough Ree (11)	Yes

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
Lough Ree SAC (11), Lough Ree SPA (3)	Lake nutrient levels and hydrological regime	Reduction in water levels impacting on littoral communities of flora and fauna	Yes. Modelling has shown a drop in water levels in the lake in the early summer and in the late-summer/autumn period. This has the potential to impact negatively on littoral and riparian habitats and species.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity. There is a planned abstraction of 41Ml/d from Killinure Lough.	Yes
Corbo Bog SAC (12)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	Yes. Some risk. Requires further investigation.	Same as Lough Ree (11)	Yes
Fortwilliam Turlough SAC (13)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	Yes. Some risk. Requires further investigation.	Same as Lough Ree (11)	Yes
River Shannon Callows SAC (14) Middle Shannon Callows SPA (2)	River nutrient levels and hydrological regime	Increase in low flow duration	Yes. Increasing the low flow duration will result in an increase in nutrient concentrations due to a reduced dilution capability (assimilative capacity) of the River Shannon, in particular for effluent from Athlone WWTP. This would result in eutrophication issues for the River Shannon and Lough Derg downstream. Increased low flow duration also has implication for water dependant habitats throughout the Shannon Callows	Same as Lough Ree (11)	Yes
River Suck Callows SPA	River nutrient levels and	Increase in low flow	Increased low flow duration also has	Same as Lough Ree (11)	Yes

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
(1)	hydrological regime	duration	implication for water dependant habitats adjacent to the River Suck Callows.		
River Little Brosna Callows SPA (33)	River nutrient levels and hydrological regime	Increase in low flow duration	Yes. Increased low flow duration has implication for wetland habitats and species within the site.	Same as Lough Ree (11)	Yes
Fin Lough (Offaly) SAC (15)	Lake nutrient levels and hydrological regime	Reduction in water levels	Yes. Increased low flow duration has implication for wetland habitats and species within the site.	Same as Lough Ree (11)	Yes
Lough Forbes Complex SAC (23)	Lake nutrient levels and hydrological regime	Reduction in water levels	No. Abstraction of water downstream will have no impact on water levels in the lake complex.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No
Lower River Shannon SAC (65)	Hydrological regime	Reduction in discharge.	No. No significant changes to the current hydrology of the Lower River Shannon, down stream of Parteen Weir, due to abstraction as long as regime is not changed.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity. There is a planned abstraction of 41Ml/d from Killinure Lough.	No
River Shannon and River Fergus Estuaries SPA (29)	Water quality, salinity and hydrological regime	Reduction in discharge	No. No changes in volume or composition of water entering the estuaries.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No
Cloonmoylan Bog SAC (78)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity, which should have positive affects on groundwater dependant habitats.	No
Barroughter	Climatic	Changes in	No. No changes to	As outlined for	No

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
Bog SAC (79)	conditions, nutrient levels and hydrological conditions	groundwater arising from changes in surface water hydrology.	water levels in Lough Derg.	Cloonmoylan Bog (78)	
Lough Derg, North East Shore SAC (80) Lough Derg SPA (31)	Lake nutrient levels and hydrological regime	Increase in residence time and associated effects on phytoplankton and nutrient dynamics	No. The increase in residence time is not large and therefore is not expected to have a significant effect on phytoplankton growth. The water level regime will be maintained within current range.	Same as Lough Ree (11)	No
Redwood Bog SAC (82)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	Yes. Some risk. Requires further investigation.	As outlined for Cloonmoylan Bog (78)	No
All Saints Bog and Esker SAC (83) All Saints Bog SPA (34)	Climatic conditions, nutrient levels, geological and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	Yes. Some risk. Requires further investigation.	As outlined for Cloonmoylan Bog (78)	No
Mongan Bog SAC (16), SPA (4)	Climatic conditions, nutrient levels, geological and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	Yes. Some risk. Requires further investigation.	As outlined for Cloonmoylan Bog (78)	No
Kilcarren-Firville Bog SAC (86)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	As outlined for Cloonmoylan Bog (78)	No
Liskeenan Fen SAC (87)	Nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	As outlined for Cloonmoylan Bog (78)	No

4.10.1.5 Option E – Lough Ree Storage

The effects of Option E would be somewhat similar to those of Option A for all sites, however less pronounced. This is due to the fact that water will be abstracted from Lough Ree at a higher rate when

flows are high and at a much reduced rate when flows are low. This is aimed at addressing issues related to low flows downstream of Athlone within the River Shannon Callows and in Lough Derg.

Lough Funshinagh SAC

The hydrological connection between Lough Funshinagh and Lough Ree is unclear. Permanently wet areas could be susceptible to drying out if water levels are altered. Further investigation of the hydrological connection is required.

Lough Ree SAC/SPA

The result of the hydrological modelling of the Shannon Catchment shows that an abstraction of 500 Ml/d from Lough Ree from November to June followed by a minimum abstraction of 50 Ml/d from July to October will result in a drop in water levels as compared with the current situation, particularly in the late summer – autumn period, but also in May. Littoral and riparian habitats and communities are sensitive to fluctuations in water levels outside the normal range, which can result in the loss of species of flora and fauna. The littoral zone of a lake is of great importance in terms of biodiversity and ecosystem function, providing substratum for aquatic plants, habitat for macroinvertebrates, spawning and nursery grounds for fish, amongst other services.

On shallow sloping shores where vegetation zonations are elongated, a prolonged interval of lower water levels would result in the vegetation along the upper slopes drying out more than usual under normal water levels. Over time, this could result in either a contraction of the vegetation zone or a shift in the location of the zone. Qualifying interests for nature designations with high sensitivity to changes in hydrological regime such as the alkaline fen, which occur adjacent to the lakeshore, would be affected. The extended periods of low flow could also be significant from the point of view of seedling recruitment and competition. Shoreline communities that experience prolonged periods of low soil moisture levels and drying out early in the growing season may become invaded by more competitive species that are intolerant of wet conditions and that were previously precluded by the higher water levels.

The drop in water level as predicted is under optimum manipulation of the flow controls at Athlone. Therefore, under actual operating conditions, the controls are likely to be operated sub-optimally, resulting in a greater fluctuation in water levels. While Option E ameliorates some of the potential adverse effects associated with Option A, it does not avoid them entirely and the influence of the altered hydrological regime is considered to constitute a possible significant adverse impact on the Lough Ree site.

Corbo Bog SAC

The hydrological connection between Corbo Bog and Lough Ree is unclear. Corbo Bog supports some groundwater dependent habitats that have some potential to be impacted upon. Further investigation of the hydrological connection is required.

Fortwilliam Turlough SAC

The hydrological connection between Fortwilliam Turlough and Lough Ree is unclear. There is potential for impacts were the groundwater dependent habitats in Fortwilliam Turlough are connected to the regional water table. Further investigation of the hydrological connection is required.

River Shannon Callows SAC and Middle Shannon Callows SPA

The hydrological modelling of the flow in the River Shannon downstream of Athlone shows that abstraction of 500 Ml/d from Lough Ree from November to June followed by minimum abstraction of 50 Ml/d from July to October will result in an increase in the low flow duration from 46 days to 50 days (1995 as driest year). This increase in low flows could have a number of adverse effects on the River Shannon as it flows through the Callows and Lough Derg downstream. A reduction in the flow reduces the assimilative capacity of the river in relation to effluent discharged into it, particularly from the Athlone wastewater treatment plant. This will result in an increase in the concentration of nutrients in the River Shannon, which will have implications for eutrophication of the river, resulting in increased algal and macrophyte growth. An increase in algal and macrophyte growth would impact adversely on the feeding of birds, particularly diving species such as tufted duck. Where lands are periodically inundated by nutrient enriched water, the soil fertility will be increased. Over time this will reduce the species diversity of affected habitats. The increase in the concentration of nutrients, such as phosphorus, in the river will have knock-on effects on water quality in Lough Derg downstream. This is discussed later on in this section under Lough Derg, North-East Shore.

While the increase in low flow days will not result in a drop in water level below that maintained by the $12m^3/s$ minimum flow, it will, however, result in the water level associated with that low discharge being reached earlier in the year and extending longer into the autumn period. This drop in water level from the existing situation could have impacts on aquatic macrophytes and spawning of coarse fish in particular. Consistently lower levels in spring could also result in some changes in land use and a tendency towards more intensive use, which would negatively impact on wetland habitats within the floodplains. A change in land use would in turn impact on ground nesting bird species such as corncrake and lapwing. While less pronounced than in Options A or D, the impact of the increased low flow period cannot be ruled out and is considered to constitute a significant adverse impact on the River Shannon Callows.

River Suck Callows SPA

The River Suck is connected to the main channel of the River Shannon and could experience similar changes in land use as a result of the increase in low flow days.

River Little Brosna Callows SPA

The River Little Brosna is connected to the main channel of the River Shannon and could experience similar changes in land use as a result of the increase in low flow days.

Fin Lough (Offaly) SAC

There is limited information available regarding the hydrology of the site (NPWS, 2005). However, it is known that Fin Lough is supplied with lime-rich water from the surrounding eskers (Tubridy, 1984). Therefore groundwater dependent habitats, such as alkaline fen, are potentially susceptible to changes in levels in the River Shannon. Further investigation of the hydrological connection and potential impacts is required.

Lough Forbes Complex SAC

The water levels upstream of Tarmonbarry are controlled by sluice gates and therefore there will be no drop in levels in the Lough Forbes complex.

Lower River Shannon SAC

Considerable work has been carried out in assessing the effects of reducing downstream flows in the river on ecological elements including habitats, macrophytes, macroinvertebrates and fish as discussed in the potential impact section see **Section 4.9**. Any abstraction from the Shannon should be done without significant change to the hydrological regime on the Lower Shannon to prevent adverse impacts on habitats and species dependant on the current regime.

River Shannon and River Fergus Estuaries SPA

As there will be no significant changes to the volume or composition of water entering the estuaries, no significant adverse effect is likely to occur in this site.

Cloonmoylan Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Barroughter Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Redwood Bog SAC

There is some limited potential for impact on Redwood Bog cSAC as a result of alterations in water levels in the River Shannon however significant negative effects are unlikely. Further investigation of the hydrological connection is required.

All Saints Bog and Esker SAC/SPA

There is some limited potential for impact on All Saints and Esker SAC/SPA as a result of alterations in water levels in the River Shannon however significant negative effects are unlikely. Further investigation of the hydrological connection is required.

Mongan Bog SAC/SPA

There is some limited potential for impact on Mongan Bog SAC/SPA as a result of alterations in water levels in the River Shannon however significant negative effects are unlikely. Further investigation of the hydrological connection is required.

Kilcarren-Firville Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Liskeenan Fen SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Lough Derg, North-East Shore SAC and Lough Derg SPA

The reduced volume of water flowing into Lough Derg will result in an increase in the residence time within the lake. This, combined with the likely increase in nutrient concentration, may result in an increase in the nutrient levels in the lough and may also lead to an increase in phytoplankton growth. The exact effect of increased residence time and nutrients on phytoplankton dynamics is obscured by the presence of zebra mussels in Lough Derg. Grazing pressure exerted by the mussels on the

phytoplankton crop of the lake already maintains the Chlorophyll a levels below that which would be expected at the present phosphorus levels, indicated by the fact that phosphorus levels have been shown not to drop during the algal growing season (Bowman, 2000). Therefore, an increase in phosphorus may well not have as dramatic an effect on the lake in terms of phytoplankton growth as may otherwise be expected. In light of this, the increase in residence time alone can be considered the principal source of possible effects on Lough Derg from the abstraction from Lough Ree.

The relative increase in residence time related to this option is small and is not expected to result in a significant increase in phytoplankton growth.

Raheenmore Bog SAC

A preliminary review of the sites hydrology indicates no significant adverse effect is likely to occur in this site. In addition, the design of the storage area will ensure that the storage area remains separate from the existing groundwater hydrology.

Table 4.16 Option E - Appropriate Assessment for the European Sites

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
Lough Funshingh SAC (8)	Lake nutrient levels and hydrological regime	Reduction in water levels	Yes. Some risk. Requires further investigation.	Same as Lough Ree (11)	Yes
Lough Ree SAC (11), Lough Ree SPA (3)	Lake nutrient levels and hydrological regime	Reduction in water levels	Yes. Modelling has shown a drop in water levels, especially in the spring/early summer. This has the potential to impact negatively on littoral and riparian habitats and species. While the effect will be less pronounced that Option A, the uncertainty related to the sensitivity of qualifying features means the risk of significant adverse effects remains.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity. The planned abstraction of 41Ml/d from Killinure Lough would increase the impact of abstracting water from Lough Ree.	Yes
Corbo Bog SAC (12)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	Yes. Some risk. Requires further investigation.	Same as Lough Ree (11)	Yes
Fortwilliam Turlough SAC (13)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	Yes. Some risk. Requires further investigation.	Same as Lough Ree (11)	Yes
River Shannon Callows SAC (14), Middle Shannon Callows SPA (2)	River nutrient levels and hydrological regime	Increase in low flow duration	Yes. Increasing the low flow duration may result in an increase in nutrient concentrations due to a reduced dilution capability (assimilative capacity) of the River Shannon, in particular for effluent from Athlone WWTP. This would result in eutrophication issues for the River	Same as for Lough Ree (11)	Yes

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
			Shannon and Lough Derg downstream. Increased low flow duration also has implication for water dependant habitats throughout the Shannon Callows.		
River Suck Callows SPA (1)	River nutrient levels and hydrological regime	Increase in low flow duration	Yes. Increased low flow duration also has implication for wetland habitats and species in the site. While the effect will be less pronounced than Option A, the uncertainty related to the sensitivity of qualifying features means risk of significant adverse effect remains.	Same as Lough Ree (11)	Yes
River Little Brosna Callows SPA (33)	River nutrient levels and hydrological regime	Increase in low flow duration	As for the River Suck Callows sensitivity of the qualifying features means the risk of significant adverse effects remains.	Same as Lough Ree 11)	Yes
Fin Lough (Offaly) SAC (15)	Lake nutrient levels and hydrological regime	Reduction in water levels	Yes. Some risk. Requires further investigation.	Same as Lough Ree 11)	Yes
Lough Forbes Complex SAC (23)	Lake nutrient levels and hydrological regime	Reduction in water levels	No. Abstraction of water downstream will have no impact on water levels in the lake complex.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No
Raheenmore Bog SAC (38)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology. Alterations to water chemistry and transfer of invasive species.	No. Groundwater dependent habitats will not be affected.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity, which should have positive effects on groundwater dependant habitats.	No
Lower River Shannon SAC (65)	Hydrological regime	Reduction in discharge.	No. No significant changes to the current hydrology of the Lower River Shannon, down stream of Parteen	The majority of the plans and projects identified are aimed at improving the water quality of water	No

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
			Weir, due to abstraction as long as regime is not changed.	bodies and protecting biodiversity. There is a planned abstraction of 41Ml/d from Killinure Lough.	
River Shannon and River Fergus Estuaries SPA (29)	Water quality, salinity and hydrological regime	Reduction in discharge	As outlined in Lower River Shannon (65)	As outlined in Lower River Shannon (65)	No
Cloonmoylan Bog SAC (78)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity, which should have positive effects on groundwater dependant habitats.	No
Barroughter Bog SAC (79)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	As outlined for Cloonmoylan Bog (78)	No
Lough Derg, North East Shore (80), Lough Derg (31)	Lake nutrient levels and hydrological regime	Increase in residence time and associated effects on phytoplankton and nutrient dynamics	No. The increase in residence time is not large and therefore is not expected to have a significant effect on phytoplankton growth or further up the food chain. The water level regime will be maintained within the current range.	Same as Lough Ree (11)	No
Redwood Bog (82)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	Yes. Some risk. Requires further investigation.	As outlined for Cloonmoylan Bog (78)	No
All Saints Bog and Esker (83), All Saints Bog SPA (34)	Climatic conditions, nutrient levels, geological and hydrological	Changes in groundwater arising from changes in surface	Yes. Some risk. Requires further investigation.	As outlined for Cloonmoylan Bog (78)	No

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
	conditions	water hydrology.			
Mongan Bog SAC (16),SPA (4)	Climatic conditions, nutrient levels, geological and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	Yes. Some risk. Requires further investigation.	As outlined for Cloonmoylan Bog (78)	No
Kilcarren-Firville Bog (86)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	As outlined for Cloonmoylan Bog (78)	No
Liskeenan Fen (87)	Nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	As outlined for Cloonmoylan Bog (78)	No

4.10.1.6 Option F1 – Lough Derg and Storage

The effects of Option F1 would be somewhat similar to those of Option B for all sites, although less pronounced. This is due to the fact that water will be abstracted from Lough Derg at a higher rate when flows are high and at a much reduced rate when flows are low. This is aimed at addressing issues related to increased residence time in Lough Derg. It is not expected that Option B would result in any significant adverse effect, as previously discussed, and Option F1 would further reduce any risk of a significant effect.

The transfer of raw water from the Shannon Catchment to a storage area in the midlands has the potential to have significant adverse impacts on the water bodies within that area if mixing were to occur. Current proposals do not propose mixing waters.

In addition to changes in to water chemistry, the possibility also exists for the transfer of invasive species from the Shannon Catchment to water bodies outside that area. The zebra mussel, which has spread throughout the Shannon Catchment, causing negative impacts upon the ecology, is probably

the best known of these invaders. The transfer of such invasive species to new catchments would constitute a significant negative impact. Current Proposals involve removing zebra mussels at abstraction and pumping stage before transferring water to storage.

Lough Ree SAC/SPA

As the abstraction is downstream of Lough Ree, no significant adverse effect is likely to occur in this site.

River Shannon Callows SAC and Middle Shannon Callows SPA

As the abstraction is downstream of the River Shannon Callows, no significant adverse effect is likely to occur in this site.

River Suck Callows SPA

As the abstraction is downstream of the River Suck Callows, no significant adverse effect is likely to occur in this site.

River Little Brosna Callows SPA

As the abstraction is downstream of the River little Brosna Callows, no significant adverse effect is likely to occur in this site.

Fin Lough (Offaly) SAC

As the abstraction is downstream of the Fin Lough, no significant adverse effect is likely to occur in this site.

Lough Forbes Complex SAC

As the abstraction is downstream of the Lough Forbes Complex, no significant adverse effect is likely to occur in this site.

Lough Derg, North-East Shore SAC and Lough Derg SPA

The abstraction will not have the same effect as abstraction from Lough Ree. The potential adverse impact on Lough Derg as a result of abstraction from Lough Ree relates to the reduction in flow into Lough Derg resulting in an increase in residence time and the increase in the concentration of nutrients in the inflowing water. With the abstraction of water from Lough Derg, the existing flow into the lake is maintained, and at the current concentration of nutrients. Brett & Benjamin (2008) showed

that the concentration of total phosphorus in the inflowing water explained the majority of the total phosphorus concentration found in a lake, with residence time explaining a small percentage. In Lough Derg, this is obscured by the presence of the zebra mussel, which exerts sufficient grazing pressure on phytoplankton to generally prevent phosphorus becoming a limiting factor in phytoplankton growth (Bowman, 2000), which may increase the importance of residence time in controlling phytoplankton growth. The relative increase in residence time related to this option is small and is not expected to result in a significant increase in phytoplankton growth.

In addition to the current input of nutrients being maintained, the abstraction of water will also result in the abstraction of nutrients and phytoplankton, which further reduces any impact on the lake as compared to Option A.

The water level in Lough Derg is strictly controlled for the purposes of electricity generation at Ardnacrusha. The abstraction of water from Lough Derg will not result in a reduction in the water levels of the lake as the operation of the Parteen Weir controls the lake level and therefore the current levels can be maintained. Based on this, the abstraction of water from Lough Derg is not considered likely to cause a significant adverse effect on the site.

Lower River Shannon SAC

Considerable work has been carried out in assessing the effects of reducing downstream flows in the river on ecological elements including habitats, macrophytes, macroinvertebrates and fish as discussed in the potential impact section see **Section 4.9**. Any abstraction from the Shannon should be done without significant change to the hydrological regime on the Lower Shannon to prevent adverse impacts on habitats and species dependant on the current regime.

River Shannon and River Fergus Estuaries SPA

As there will be no significant changes to the volume or composition of water entering the estuaries, no significant adverse effect is likely to occur in this site.

Redwood Bog SAC

As the abstraction is downstream of Redwood Bog, no significant adverse effect is likely to occur in this site.

All Saints Bog and Esker SAC and All Saints Bog SPA

As the abstraction is downstream of All Saints Bog and Esker, no significant adverse effect is likely to occur in this site.

Mongan Bog SAC/SPA

As the abstraction is downstream of Mongan Bog, no significant adverse effect is likely to occur in this site.

Cloonmoylan Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Barroughter Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Kilcarren-Firville Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Liskeenan Fen SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Raheenmore Bog SAC

A preliminary review of the sites hydrology indicates no significant adverse effect is likely to occur in this site. In addition, the design of the storage area will ensure that the storage area remains separate from the existing groundwater hydrology and no overflows would occur.

Table 4.17 Option F1 - Appropriate Assessment for the European Sites

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
Lough Ree SAC (11), Lough Ree (SPA) (3)	Lake nutrient levels and hydrological regime	Reduction in water levels	No. Abstraction downstream will have no impact on levels in Lough Ree	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity. The planned abstraction of 41Ml/d from Killinure Lough is for use within the catchment and will not reduce the volume of water flowing from Lough Ree into Lough Derg.	No
River Shannon Callows SAC (14), Middle Shannon Callows SPA (2)	River nutrient levels and hydrological regime	Alteration to flows and levels	No. Abstraction downstream will have no impact on the hydrology of the site	Same as Lough Ree SAC (11)	No
River Suck Callows SPA (1)	River nutrient levels and hydrological regime	Increase in low flow duration	No. Abstraction downstream will have no impact on the hydrology of the site	Same as Lough Ree SAC (11)	No
River Little Brosna Callows SPA (33)	River nutrient levels and hydrological regime	Increase in low flow duration	No. Abstraction downstream will have no impact on the hydrology of the site	Same as Lough Ree SAC (11)	No
Fin Lough (Offaly) SAC (15)	Lake nutrient levels and hydrological regime	Reduction in water levels	No. Abstraction downstream will have no impact on the hydrology of the site	Same as Lough Ree SAC (11)	No
Lough Forbes Complex SAC (23)	Lake nutrient levels and hydrological regime	Reduction in water levels	No. Abstraction of water downstream will have no impact on water levels in the lake complex.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
Raheenmore Bog SAC (38)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology. Alterations to water chemistry and transfer of invasive species.	No. Groundwater dependent habitats will not be affected.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity, which will also have positive effects on groundwater dependent habitats.	No
Lower River Shannon SAC (65)	Hydrological regime	Reduction in discharge.	No. No significant changes to the current hydrology of the Lower River Shannon, down stream of Parteen Weir, due to abstraction as long as regime is not changed.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity. There is a planned abstraction of 41Ml/d from Killinure Lough.	No
River Shannon and River Fergus Estuaries SPA (29)	Water quality, salinity and hydrological regime	Reduction in discharge	No. No changes in volume or composition of water entering the estuaries.	As outlined in Lower River Shannon SAC (65)	No
Cloonmoylan Bog SAC (78)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity, which will also have positive effects on groundwater dependent habitats.	No
Barroughter Bog SAC (79)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	As outlined in Cloonmoylan Bog SAC (78)	No
Lough Derg, North East Shore SAC (80) Lough Derg	Lake nutrient levels and hydrological regime	Increase in residence time and associated effects on phytoplankton and nutrient dynamics and reduction in	No. The increase in residence time is not large and therefore is not expected to have a significant	Same as Lough Ree SAC (11)	No

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
SPA (31)		water levels.	effect on phytoplankton growth. The water level regime will be maintained within current range.		
Redwood Bog SAC (8)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. Abstraction downstream will have no impact on the hydrology of the site.	As outlined in Cloonmoylan Bog SAC (78)	No
All Saints Bog and Esker SAC (83) All Saints Bog SPA (34)	Climatic conditions, nutrient levels, geological and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. Abstraction downstream will have no impact on the hydrology of the site.	As outlined in Cloonmoylan Bog SAC (78)	No
Mongan Bog SAC (16) SPA (4)	Climatic conditions, nutrient levels, geological and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. Abstraction downstream will have no impact on the hydrology of the site.	As outlined in Cloonmoylan Bog SAC (78)	No
Kilcarren-Firville Bog SAC (86)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	As outlined in Cloonmoylan Bog SAC (78)	No
Liskeenan Fen SAC (87)	Nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	As outlined in Cloonmoylan Bog SAC (78)	No

4.10.1.7 Option F2 – Lough Derg and Storage

The effects of Option F2 are the same as those of Option F1 for all sites except Raheenmore Bog. An alternative storage site has been identified for this option and is located on a cutaway bog located near Portarlington.

Lough Ree SAC/SPA

As the abstraction is downstream of Lough Ree, no significant adverse effect is likely to occur in this site.

River Shannon Callows SAC and Middle Shannon Callows SPA

As the abstraction is downstream of the River Shannon Callows, no significant adverse effect is likely to occur in this site.

River Suck Callows SPA

As the abstraction is downstream of the River Suck Callows, no significant adverse effect is likely to occur in this site.

River Little Brosna Callows SPA

As the abstraction is downstream of the River Suck Callows, no significant adverse effect is likely to occur in this site.

Fin Lough (Offaly) SAC

As the abstraction is downstream of the Fin Lough, no significant adverse effect is likely to occur in this site.

Lough Forbes Complex SAC

As the abstraction is downstream of the Lough Forbes Complex, no significant adverse effect is likely to occur in this site.

Lough Derg, North-East Shore SAC and Lough Derg SPA

The abstraction will not have the same effect as abstraction from Lough Ree. The potential adverse impact on Lough Derg as a result of abstraction from Lough Ree relates to the reduction in flow into Lough Derg resulting in an increase in residence time and the increase in the concentration of nutrients in the inflowing water. With the abstraction of water from Lough Derg, the existing flow into the lake is maintained, and at the current concentration of nutrients. Brett & Benjamin (2008) showed that the concentration of total phosphorus in the inflowing water explained the majority of the total phosphorus concentration found in a lake, with residence time explaining a small percentage. In Lough Derg, this is obscured by the presence of the zebra mussel, which exerts sufficient grazing pressure on phytoplankton to generally prevent phosphorus becoming a limiting factor in phytoplankton growth (Bowman, 2000), which may increase the importance of residence time in controlling phytoplankton growth. The relative increase in residence time related to this option is small and is not expected to result in a significant increase in phytoplankton growth.

In addition to the current input of nutrients being maintained, the abstraction of water will also result in the abstraction of nutrients and phytoplankton, which further reduces any impact on the lake as compared to Option A.

The water level in Lough Derg is strictly controlled for the purposes of electricity generation at Ardnacrusha. The abstraction of water from Lough Derg will not result in a reduction in the water levels of the lake as the operation of the Parteen Weir controls the lake level and therefore the current levels can be maintained. Based on this, the abstraction of water from Lough Derg is not considered likely to cause a significant adverse effect on the site.

Lower River Shannon SAC

Considerable work has been carried out in assessing the effects of reducing downstream flows in the river on ecological elements including habitats, macrophytes, macroinvertebrates and fish as discussed in the potential impact section see **Section 4.9**. Any abstraction from the Shannon should be done without significant change to the hydrological regime on the Lower Shannon to prevent adverse impacts on habitats and species dependant on the current regime.

River Shannon and River Fergus Estuaries SPA

As there will be no significant changes to the volume or composition of water entering the estuaries, no significant adverse effect is likely to occur in this site.

Redwood Bog SAC

As the abstraction is downstream of Redwood Bog, no significant adverse effect is likely to occur in this site.

All Saints Bog and Esker SAC and All Saints Bog SPA

As the abstraction is downstream of All Saints Bog and Esker, no significant adverse effect is likely to occur in this site.

Mongan Bog SAC/SPA

As the abstraction is downstream of Mongan Bog, no significant adverse effect is likely to occur in this site.

Cloonmoylan Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Barroughter Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Kilcarren-Firville Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Liskeenan Fen SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

River Barrow and River Nore SAC

The transfer of inter-catchment water, which may contain invasive species, increases the risk of spreading invasive species to a new catchment and the River Barrow and River Nore systems through accidental contamination.

Table 4.18 Option F2 - Appropriate Assessment for the European Sites

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
Lough Ree SAC (11), Lough Ree (SPA) (3)	Lake nutrient levels and hydrological regime	Reduction in water levels	No. Abstraction downstream will have no impact on levels in Lough Ree	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity. The planned abstraction of 41Ml/d from Killinure Lough could reduce the volume of water flowing from Lough Ree.	No
River Shannon Callows SAC (14), Middle Shannon Callows SPA (2)	River nutrient levels and hydrological regime	Alteration to flows and levels	No. Abstraction downstream will have no impact on the hydrology of the site.	Same as Lough Ree SAC (11)	No
River Suck Callows	River nutrient levels and hydrological regime	Increase in low flow duration	No. Abstraction downstream	Same as Lough Ree SAC (11)	No

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
SPA (1)			will have no impact on the hydrology of the site.		
River Little Brosna Callows SPA (33)	River nutrient levels and hydrological regime	Increase in low flow duration	No. Abstraction downstream will have no impact on the hydrology of the site.	Same as Lough Ree SAC (11)	No
Fin Lough (Offaly) SAC (15)	Lake nutrient levels and hydrological regime	Reduction in water levels	No. Abstraction downstream will have no impact on the hydrology of the site.	Same as Lough Ree SAC (11)	No
Lough Forbes Complex SAC (23)	Lake nutrient levels and hydrological regime	Reduction in water levels	No. Abstraction of water downstream will have no impact on water levels in the lake complex.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No
Lower River Shannon SAC (65)	Hydrological regime	Reduction in discharge.	No. No significant changes to the current hydrology of the Lower River Shannon, down stream of Parteen Weir, due to abstraction as long as regime is not changed.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity. There is a planned abstraction of 41Ml/d from Killinure Lough.	No
River Shannon and River Fergus Estuaries SPA (29)	Water quality, salinity and hydrological regime	Reduction in discharge	No. No changes in volume or composition of water entering the estuaries.	As outlined in Lower River Shannon SAC (65)	No
Cloonmoylan Bog SAC (78)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity, which will	No

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
				also have positive effects on groundwater dependent habitats.	
Barrougher Bog SAC (79)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	As outlined in Cloonmoylan Bog SAC (78)	No
Lough Derg, North East Shore SAC (80) Lough Derg SPA (31)	Lake nutrient levels and hydrological regime	Increase in residence time and associated effects on phytoplankton and nutrient dynamics and reduction in water levels.	No. The increase in residence time is not large and therefore is not expected to have a significant effect on phytoplankton growth. The water level regime will be maintained within current range.	Same as Lough Ree SAC (11)	No
Redwood Bog SAC (8)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. Abstraction downstream will have no impact on the hydrology of the site.	As outlined in Cloonmoylan Bog SAC (78)	No
All Saints Bog and Esker SAC (83) All Saints Bog SPA (34)	Climatic conditions, nutrient levels, geological and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. Abstraction downstream will have no impact on the hydrology of the site.	As outlined in Cloonmoylan Bog SAC (78)	No
Mongan Bog SPA (4)	Climatic conditions, nutrient levels, geological and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. Abstraction downstream will have no impact on the hydrology of the site.	As outlined in Cloonmoylan Bog SAC (78)	No
Kilcarren-Firville Bog SAC (86)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	As outlined in Cloonmoylan Bog SAC (78)	No
Liskeenan Fen SAC (87)	Nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	As outlined in Cloonmoylan Bog Sac (78)	No

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
River Barrow and River Nore SAC	River nutrient levels and hydrological regime	Potential spread of invasive species.	No. Invasive species are being removed at source to prevent spread.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No

4.10.1.8 Option G – Lough Ree and Impoundment

The effects of Option G would be somewhat similar to those of Option A, as previously discussed, however less pronounced. This is due to the fact that water will be abstracted from Lough Ree at a higher rate when flows are high and at a much reduced rate when flows are low. The added potential impact of this option is related to the construction and operation of an impoundment area in the Wicklow Mountains.

Lough Funshinagh SAC

The hydrological connection between Lough Funshinagh and Lough Ree is unclear. Permanently wet areas could be susceptible to drying out if water levels are altered. Further investigation of the hydrological connection is required.

Lough Ree SAC/SPA

The result of the hydrological modelling of the Shannon Catchment shows that the abstraction of 420 Ml/d water from Lough Ree from November to June followed by minimum abstractions of 60Ml/day from July to October will result in a drop in water levels as compared with the current situation in spring and early summer. Littoral and riparian habitats and communities are sensitive to fluctuations in water levels outside the normal range, which can result in the loss of species of flora and fauna. The littoral zone of a lake is of great importance in terms of biodiversity and ecosystem function, providing substratum for aquatic plants, habitat for macroinvertebrates, spawning and nursery grounds for fish, amongst other services.

On shallow sloping shores where vegetation zonations are elongated, a prolonged interval of lower water levels would result in the vegetation along the upper slopes drying out more than usual under normal water levels. Over time, this could result in either a contraction of the vegetation zone or a shift in the location of the zone. Qualifying interests for nature designations with high sensitivity to changes in hydrological regime such as the alkaline fen, which occur adjacent to the lakeshore, would be

affected. The extended periods of low flow could also be significant from the point of view of seedling recruitment and competition. Shoreline communities that experience prolonged periods of low soil moisture levels and drying out early in the growing season may become invaded by more competitive species that are intolerant of wet conditions and that were previously precluded by the higher water levels.

The drop in water level as predicted is under optimum manipulation of the flow controls at Athlone. Therefore, under actual operating conditions, the controls are likely to be operated sub-optimally, resulting in a greater fluctuation in water levels. This impact is considered to constitute a likely significant adverse impact on the Lough Ree site.

Corbo Bog SAC

The hydrological connection between Corbo Bog and Lough Ree is unclear. Corbo Bog supports some groundwater dependent habitats that have some potential to be impacted upon. Further investigation of the hydrological connection is required.

Fortwilliam Turlough SAC

The hydrological connection between Fortwilliam Turlough and Lough Ree is unclear. There is potential for impacts were the groundwater dependent habitats in Fortwilliam Turlough are connected to the regional water table. Further investigation of the hydrological connection is required.

River Shannon Callows SAC and Middle Shannon Callows SPA

The hydrological modelling of the flow in the River Shannon downstream of Athlone shows that the abstraction of 420 Ml/d water from Lough Ree from November to June followed by minimum abstractions of 60Ml/day from July to October will result in an increase in the low flow duration from 46 days to 51 days (1995 as driest year). This increase in low flows could have a number of adverse effects on the River Shannon as it flows through the Callows and Lough Derg downstream. A reduction in the flow reduces the assimilative capacity of the river in relation to effluent discharged into it, particularly from the Athlone wastewater treatment plant. This will result in an increase in the concentration of nutrients in the River Shannon, which will have implications for eutrophication of the river, resulting in increased algal and macrophyte growth. An increase in algal and macrophyte growth would impact adversely on the feeding of birds, particularly diving species such as tufted duck. Where lands are periodically inundated by nutrient enriched water, the soil fertility will be increased. Over time this will reduce the species diversity of affected habitats. The increase in the concentration of nutrients, such as phosphorus, in the river will have knock-on effects on water quality in Lough Derg downstream. This is discussed later on in this section under Lough Derg, North-East Shore.

While the increase in low flow days will not result in a drop in water level below that maintained by the 12m^3/s minimum flow, it will, however, result in the water level associated with that low discharge being reached earlier in the year and extending longer into the autumn period. This drop in water level from the existing situation could have impacts on aquatic macrophytes and spawning of coarse fish in particular. Consistently lower levels in spring could also result in some changes in land use and a tendency towards more intensive use, which would negatively impact on wetland habitats within the floodplains. A change in land use would in turn impact on ground nesting bird species such as corncrake and lapwing. The impact of the increased low flow period is considered to constitute a significant adverse impact on the River Shannon Callows.

River Suck Callows SPA

The River Suck is connected to the main channel of the River Shannon and could experience similar changes in land use as a result of the increase in low flow days.

River Little Brosna Callows SPA

The River Little Brosna is connected to the main channel of the River Shannon and could experience similar changes in land use as a result of the increase in low flow days.

Fin Lough (Offaly) SAC

There is limited information available regarding the hydrology of the site (NPWS, 2005). However, it is known that Fin Lough is supplied with lime-rich water from the surrounding eskers (Tubridy, 1984). Therefore groundwater dependent habitats, such as alkaline fen, are potentially susceptible to changes in levels in the River Shannon. Further investigation of the hydrological connection and potential impacts is required.

Lough Forbes Complex SAC

The water levels upstream of Tarmonbarry are controlled by sluice gates and therefore there will be no drop in levels in the Lough Forbes complex.

Lower River Shannon SAC

Considerable work has been carried out in assessing the effects of reducing downstream flows in the river on ecological elements including habitats, macrophytes, macroinvertebrates and fish as discussed in the potential impact section see **Section 4.9**. Any abstraction from the Shannon should be done without significant change to the hydrological regime on the Lower Shannon to prevent adverse impacts on habitats and species dependant on the current regime.

River Shannon and River Fergus Estuaries SPA

As there will be no significant changes to the volume or composition of water entering the estuaries, no significant adverse effect is likely to occur in this site.

Cloonmoylan Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Barroughter Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Redwood Bog SAC

There is some limited potential for impact on Redwood Bog cSAC as a result of alterations in water levels in the River Shannon however significant negative effects are unlikely. Further investigation of the hydrological connection is required.

All Saints Bog and Esker SAC/SPA

There is some limited potential for impact on All Saints and Esker SAC/SPA as a result of alterations in water levels in the River Shannon however significant negative effects are unlikely. Further investigation of the hydrological connection is required.

Mongan Bog SAC/SPA

There is some limited potential for impact on Mongan Bog SAC/SPA as a result of alterations in water levels in the River Shannon however significant negative effects are unlikely. Further investigation of the hydrological connection is required.

Kilcarren-Firville Bog SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Liskeenan Fen SAC

As there will be no changes to water levels in Lough Derg, no significant adverse effect is likely to occur in this site.

Lough Derg, North-East Shore SAC and Lough Derg SPA

The reduced volume of water flowing into Lough Derg will result in an increase in the residence time within the lake. This, combined with the likely increase in nutrient concentration, may result in an increase in the nutrient levels in the lough and may also lead to an increase in phytoplankton growth. The exact effect of increased residence time and nutrients on phytoplankton dynamics is complicated by the presence of zebra mussels in Lough Derg. Grazing pressure exerted by the mussels on the phytoplankton crop of the lake already maintains the Chlorophyll A levels below that which would be expected at the present phosphorus levels, indicated by the fact that phosphorus levels have been shown not to drop during the algal growing season (Bowman, 2000). Therefore, an increase in phosphorus may well not have as dramatic an effect on the lake in terms of phytoplankton growth as may otherwise be expected. In light of this, the increase in residence time alone can be considered the principal source of possible effects on Lough Derg from the abstraction from Lough Ree.

The relative increase in residence time related to this option is small and is not expected to result in a significant increase in phytoplankton growth.

Wicklow Mountains

The transfer of raw water from the Shannon Catchment to an impoundment area in the Wicklow Mountains has the potential to have significant adverse impacts on the water bodies within the Wicklow Mountains. The inter-catchment transfer could result in changes to the water chemistry of the receiving water if mixed and also holds the potential for effects on other water bodies as a result of accidental losses through leakage from impoundment.

The possibility also exists for the transfer of invasive species from the Shannon Catchment to the water bodies of the Wicklow Mountains. The zebra mussel, which has spread throughout the Shannon Catchment, causing negative impacts upon ecology, is probably the best known of these invaders. The transfer of such invasive species to new catchments would constitute a significant negative impact. Current proposals involve removal of zebra mussels at source.

Glenasmole Valley

The potential impacts to the Glenasmole Valley are similar to the Wicklow Mountains, which include alteration to water chemistry and the spread of invasive species.

Poulaphouca Reservoir SPA

The potential impacts to the Poulaphouca Reservoir are similar to the Wicklow Mountains, which include alteration to water chemistry and the spread of invasive species.

Table 4.19 Option G - Appropriate Assessment for the European Sites

European Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
Lough Funshingh SAC (8)	Lake nutrient levels and hydrological regime	Reduction in water levels	Yes. Some risk. Requires further investigation.	Same as Lough Ree SAC (11)	Yes
Lough Ree SAC (11), Lough Ree SPA (3)	Lake nutrient levels and hydrological regime	Reduction in water levels impacting on littoral communities of flora and fauna	Yes. Modelling has shown a drop in water levels, especially in spring/early summer. This has the potential to impact negatively on littoral and riparian habitats and species. While the effect will be less pronounced than that of Option A, the uncertainty related to the sensitivity of qualifying features means risk of significant adverse effects remains.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity. The planned abstraction of 41Ml/d from Killinure Lough could increase the impact of abstracting water from Lough Ree.	Yes
Corbo Bog SAC (12)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	Yes. Some risk. Requires further investigation.	Same as Lough Ree SAC (11)	Yes
Fortwilliam Turlough SAC (13)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	Yes. Some risk. Requires further investigation.	Same as Lough Ree SAC (11)	Yes
River Shannon Callows SAC (14), Middle Shannon Callows SPA (2)	River nutrient levels and hydrological regime	Increase in low flow duration	Yes. Increasing the low flow duration may result in an increase in nutrient concentrations due to a reduced dilution capability (assimilative capacity) of the River Shannon, in particular for effluent from Athlone	Same as Lough Ree SAC (11)	Yes

European Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
			WWTP. This would result in eutrophication issues for the River Shannon and Lough Derg downstream. Increased low flow duration also has implication for water dependant habitats throughout the Shannon Callows		
River Suck Callows SPA (1)	River nutrient levels and hydrological regime	Increase in low flow duration	Yes. Increased low flow duration also has implication for wetland habitats and species within the site. While the effect will be less pronounced than that of Option A, the uncertainty related to the sensitivity of qualifying features means risk of significant adverse effects remains.	Same as Lough Ree SAC (11)	Yes
River Little Brosna Callows SPA (33)	River nutrient levels and hydrological regime	Increase in low flow duration	Yes. Increased low flow duration also has implication for wetland habitats and species within the site. While the effect will be less pronounced than that of Option A, the uncertainty related to the sensitivity of qualifying features means risk of significant adverse effects remains.	Same as Lough Ree SAC (11)	Yes
Fin Lough (Offaly) SAC (15)	Lake nutrient levels and hydrological regime	Reduction in water levels	Yes. Some risk. Further investigation required.	Same as Lough Ree SAC (11)	Yes
Lough Forbes Complex SAC (23)	Lake nutrient levels and hydrological regime	Reduction in water levels	No. Abstraction of water downstream will have no impact on water levels in the lake complex.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No
Glenasmole Valley SAC (63)	Water chemistry and existing ecology	Transfer of invasive species	Yes. Transfer of raw water from the Shannon Catchment has the potential to introduce invasive species in the impoundment area, which in turn increases the chances of spread to nearby water bodies. Invasive species could also be transferred to other sites along the pipeline route, through normal	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No

European Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
			operation and leakage.Removal of zebra mussels at source is envisaged.		
Poulaphouca Reservoir SPA (37)	Water chemistry and existing ecology	Transfer of invasive species	Yes. Transfer of raw water from the Shannon Catchment has the potential to introduce invasive species in the impoundment area, which in turn increases the chances of spread to nearby water bodies. Invasive species could also be transferred to other sites along the pipeline route, through normal operation and leakage. Removal of zebra mussels at source is envisaged..	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No
Wicklow Mountains SAC (64)	Water chemistry and existing ecology	Alteration to water chemistry and transfer of invasive species	Yes. Transfer of raw water from the Shannon Catchment has the potential to introduce invasive species to the watercourses of the Wicklow Mountains, and to other sites along the pipeline route, through normal operation and leakage. Mixing of waters as a result of inter-catchment transfers will result in an alteration to the water chemistry, e.g. pH, which may impact upon ecology. Removal of zebra mussels at source is envisaged and water mixing is not proposed.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No Yes
Lower River Shannon SAC (65)	Hydrological regime	Reduction in discharge.	No. No significant changes to the current hydrology of the Lower River Shannon, down stream of Parteen Weir, due to abstraction as long as regime is not changed.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity. There is a planned abstraction of 41Ml/d from Killinure Lough.	No
River Shannon and River Fergus Estuaries SPA (29)	Water quality, salinity and hydrological regime	Reduction in discharge	No. No changes in volume or composition of water entering the estuaries.	As outlined in Lower River Shannon SAC (65)	No

European Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
Cloonmoylan Bog SAC (78)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity, which will also have positive effects on groundwater dependent habitats.	No
Barroughter Bog SAC (79)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	As outlined for Cloonmoylan Bog SAC (78)	No
Lough Derg, North East Shore SAC (80), Lough Derg SPA (31)	Lake nutrient levels and hydrological regime	Increase in residence time and associated effects on phytoplankton and nutrient dynamics	No. The increase in residence time is not large and therefore is not expected to have a significant effect on phytoplankton growth. The water level regime will be maintained within the current range.	Same as Lough Ree SAC (11)	No
Redwood Bog SAC (82)	Climatic conditions, nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	Yes. Some risk. Further investigation required.	As outlined for Cloonmoylan Bog SAC (78)	No
All Saints Bog and Esker SAC (83), All Saints Bog SPA (34)	Climatic conditions, nutrient levels, geological and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	Yes. Some risk. Further investigation required.	As outlined for Cloonmoylan Bog SAC (78)	No
Mongan Bog SPA (4)	Climatic conditions, nutrient levels, geological and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	Yes. Some risk. Further investigation required.	As outlined for Cloonmoylan Bog SAC (78)	No
Kilcarren-Firville Bog SAC (86)	Climatic conditions, nutrient levels and	Changes in groundwater arising from	No. No changes to water levels in Lough Derg.	As outlined for Cloonmoylan Bog SAC (78)	No

European Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
	hydrological conditions	changes in surface water hydrology.			
Liskeenan Fen SAC (87)	Nutrient levels and hydrological conditions	Changes in groundwater arising from changes in surface water hydrology.	No. No changes to water levels in Lough Derg.	As outlined for Cloonmoylan Bog SAC (78)	No

4.10.1.9 Option H – Desalination

Boyne Coast and Estuary SAC/SPA

As the modelling of the brine discharge has illustrated, there will be no effect on Boyne Coast and Estuary as a result of this discharge.

Lambay Island SAC/SPA

The grey seal population of Lambay Island was considered in relation to the proposed construction and operation of a desalination plant at north Fingal. Possible effects on fish populations as a result of the brine discharge were considered to be the principal source of significant negative impact on the seal population through negative effects on their food source. The site also holds internationally and nationally important populations of cormorant, shag, razorbill and guillemot. Impacts on fish stocks would eventually lead to impacts further up the food chain on these species. The modelling of the brine discharge has shown that the salinity of the discharge drops close to background levels in the immediate vicinity of the diffuser, therefore significant negative effects on the surrounding flora, fauna and habitats are not expected. Carrying out ground investigations using acoustic techniques is regulated by the NPWS, which will reduce any impact related to these activities. The addition of sludge dispersion would involve the release of suspended solids and iron (anti-coagulant), which is likely to impact upon the surrounding ecology; increased concentrations of iron in seawater has been shown to stimulate phytoplankton growth, which can lead to algal blooms. In light of this, it is considered that the addition of sludge dispersion would risk a significant adverse effect on the ecology of the area and the European sites.

Rogerstown Estuary SAC/SPA

As the modelling of the brine discharge has illustrated, there will be no effect on Rogerstown Estuary as a result of this discharge.

Malahide Estuary SAC

As the modelling of the brine discharge has illustrated, there will be no effect on Malahide Estuary as a result of this discharge.

Baldoyle Bay SAC

As the modelling of the brine discharge has illustrated, there will be no effect on Baldoyle Bay as a result of this discharge.

Ireland's Eye SAC/SPA

As the modelling of the brine discharge has illustrated, there will be no effect on Ireland's Eye as a result of this discharge.

Rockabill SPA

Rockabill Island supports roseate tern, common tern and arctic tern. All three species are listed on Annex I of the E.U. Birds Directive and feed in the surrounding waters. Sludge dispersion is likely to impact upon the surrounding ecology through increased concentrations of iron in seawater and the stimulation of phytoplankton growth, which can lead to algal blooms. This could have significant effects on fish populations and subsequently on these bird species. In light of this, it is considered that the addition of sludge dispersion would risk a significant adverse effect on the ecology of the area and the European sites.

Skerries Islands SPA

The islands support a number of breeding seabirds and wintering waterfowl. The Brent goose population is of International Importance. Golden Plover and Short-eared Owl are, EU Birds Directive Annex I species. Sludge dispersion is likely to impact upon the surrounding ecology through increased concentrations of iron in seawater and the stimulation of phytoplankton growth, which can lead to algal blooms. This could have significant effects on fish populations and subsequently on these bird species. In light of this, it is considered that the addition of sludge dispersion would risk a significant adverse effect on the ecology of the area and the European sites.

Table 4.20 Option H - Appropriate Assessment for the European Sites

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
Boyne Coast and Estuary SAC/SPA (51)	Hydrology, salinity and sensitive to pollutants	Alteration to salinity and nutrients	No. Modelling has shown that brine solution discharge will not affect this site.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No
Rogerstown Estuary SAC/SPA (52)	Hydrology, salinity and sensitive to pollutants	Alteration to salinity and nutrients	No. Modelling has shown that brine solution discharge will not affect this site.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No
Lambay Island SAC/SPA (53)	Water chemistry	Impacts of brine discharge on water chemistry and associated effects on phytoplankton and fish	Yes. While the dilution of the brine solution on discharge through diffusers reduces salinity to close to background levels in the immediate vicinity of the discharge points, the 'with sludge dispersion' scenario has potential for significant adverse effects in relation to phytoplankton growth.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No
Malahide Estuary SAC (54)	Hydrology, salinity and sensitive to pollutants	Alteration to salinity and nutrients	No. Modelling has shown that brine solution discharge will not affect this site.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No
Baldoyle Bay SAC/SPA (55)	Hydrology, salinity and sensitive to pollutants	Alteration to salinity and nutrients	No. Modelling has shown that brine solution discharge will not affect this site.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No
Ireland's Eye SAC/SPA (56)	Water chemistry	Impacts of brine discharge on water chemistry and associated effects on phytoplankton and fish	No. Modelling has shown that brine solution discharge will not affect this site.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No
Rockabill SPA SPA (19)	Water chemistry	Impacts of brine discharge on water	Yes. While the dilution of the brine solution on discharge through diffusers reduces salinity to close to	The majority of the plans and projects identified are aimed at improving the water	No

Site	Key Environmental Condition to support the site integrity	Possible impacts arising from the Plan	Is there a risk of significant effect?	Possible impacts from other trends, plans etc.	Is there a risk of significant in combination effects
		chemistry and associated effects on phytoplankton and fish	background levels in the immediate vicinity of the discharge points, the 'with sludge dispersion' scenario has potential for significant adverse effects in relation to phytoplankton growth.	quality of water bodies and protecting biodiversity.	
Skerries Islands SPA (20)	Water chemistry	Impacts of brine discharge on water chemistry and associated effects on phytoplankton and fish	Yes. While the dilution of the brine solution on discharge through diffusers reduces salinity to close to background levels in the immediate vicinity of the discharge points, the 'with sludge dispersion' scenario has potential for significant adverse effects in relation to phytoplankton growth.	The majority of the plans and projects identified are aimed at improving the water quality of water bodies and protecting biodiversity.	No

4.11 IN COMBINATION EFFECTS

Following a review of the other plans and projects (in **Section 3.4**) that may interact with the draft Plan, it has been concluded that the only one that has the potential to have a significant in-combination effect is the abstraction of water from Killinure Lough, Lough Ree for supply of water planned by Westmeath County Council. The remainder of the plans are aimed at improving the aquatic systems and their ecology and therefore will not result in a significant in-combination effect.

The proposed abstraction from Killinure Lough has the potential to have an in-combination effect with proposals to abstract water from Lough Ree. This additional abstraction is considered to be likely to cause in-combination effects for the options related to Lough Ree (Options A, D, E and G), by having a cumulative effect on water levels in Lough Ree and on low flow durations downstream through the River Shannon Callows. No in-combination effects were identified for Options B, C, F1, F2 and H.

4.12 MITIGATION

4.12.1 Introduction

Where a likely significant adverse effect has been identified, or cannot conclusively be ruled out, it may be possible to proceed with the option where mitigation measures can be implemented to

address the adverse effect. The mitigation hierarchy includes mitigation by avoidance, mitigation by reduction and mitigation by remedy, with avoidance being the preferred option.

In general all of the options require a water intake and therefore there is a risk of entrainment and / or impingement of fish. In light of this, appropriate design of an intake is important. Low intake velocities, appropriate screening and correct orientation of the intake are all aspects that should be considered in designing and installing the intake structure.

The following sections discuss the potential mitigation measures for each specific option, which may aid in avoiding or reducing any likely significant effect of the abstraction or desalination.

4.12.2 Mitigation for Effect on Site Integrity

4.12.2.1 Option A – Lough Ree

It is not possible to rule out the potential of the abstraction of 350 Ml/d from Lough Ree having a significant adverse impact upon European sites through the alteration to water levels, low flow period duration and retention times in Lough Derg. Possible mitigation measures include altering the abstraction rate during low flow periods in order to maintain flows and levels closer to the current situation. This may include the storage of water abstracted at a higher rate during the winter when flows are very high for use during the summer when flows are low and when the abstraction rate would be reduced or abstraction ceased altogether. In reality, this mitigation has been presented as separate options (Option E and G), which relate to storage, while Option D is an option aimed at phasing the abstraction and including future abstraction from Lough Derg to minimise impacts on Lough Ree and the River Shannon Callows.

The abstraction of water from the Shannon System will result in a reduction in the flow downstream. While little can be done to mitigate the reduction in flow in the section from Lough Ree to Lough Derg, significant effects in the River Shannon Channel downstream of Parteen Weir are not anticipated as the hydrological regime downstream of Parteen Weir will not alter significantly. Currently, a minimum compensation flow of 10 m^3/s is maintained down the river channel, with much higher flows recorded during flood periods (up to 400 m^3/s), while up to 400m^3/s may pass through Ardnacrusha. In order to maintain the current situation in the River Shannon downstream of Parteen with regard to aquatic ecology, it is important that existing flows are not altered significantly by any abstraction upstream. To this end, flows downstream of the Parteen Weir will be maintained at the expense of flows down the headrace except where discharge is sufficiently high that the percentage reduction in flow is small compared with the total discharge. The percentage involved may be in the region of 5-10% as recommended for similar rivers in the UK where High Ecological Potential is desired under the Water

Framework Directive (Acreman *et al*., 2006). This means that water would have to be abstracted from the headrace when flows in the River Shannon are between 40-80m^3/s or less.

It does not appear possible to mitigate the likely significant effects related to this option while fulfilling the requirements of the Draft Plan.

Table 4.21 Mitigation Measures for Option A – Lough Ree

European Site	Potential Effect on Integrity	Mitigation Measures	Is there still a risk on integrity?	Is Stage 3 Required?
Lough Ree SAC (11), Lough Ree SPA (3)	Changes to water level	None possible within this option, however Options D-F and G represent options to address potential impacts of Option A	Yes	Yes
River Shannon Callows SAC (14) Middle Shannon Callows SPA (2)	Changes to water levels and increase in low flow duration	As for Lough Ree	Yes	Yes
River Suck Callows SPA (1)	Changes to water levels and increase in low flow duration	As for Lough Ree	Yes	Yes
River Little Brosna Callows SPA (33)	Changes to water levels and increase in low flow duration	As for Lough Ree	Yes	Yes
Fin Lough (Offaly) SAC (15)	Potential changes in groundwater, further studies needed (groundwater modelling)	Not determined at this stage	Yes	Yes
Lough Forbes Complex SAC (23)	No significant adverse effect expected	None necessary	No	No
Lough Derg, North East Shore SAC (80), Lough Derg SPA (31)	Increase in residence time	None possible within this option. See Lough Ree above	Yes	Yes
River Shannon and River Fergus Estuaries	No significant adverse effect expected	None necessary	No	No

European Site	Potential Effect on Integrity	Mitigation Measures	Is there still a risk on integrity?	Is Stage 3 Required?
SPA (29)				
Cloonm-oylan Bog SAC (78)	No significant adverse effect expected	None necessary	No	No
Barroughter Bog SAC (79)	No significant adverse effect expected	None necessary	No	No
Redwood Bog SAC (82)	Potential changes in groundwater, further studies needed (groundwater modelling)	Not determined at this stage	Yes	Yes
All Saints Bog and Esker SAC (83), All Saints Bog SPA (34)	Potential changes in groundwater, further studies needed (groundwater modelling)	Not determined at this stage	Yes	Yes
Mongan Bog SAC (16)/SPA (4)	Potential changes in groundwater, further studies needed (groundwater modelling)	Not determined at this stage	Yes	Yes
Lower River Shannon SAC (65)	Alteration to hydrology	Prevent any significant alteration to the existing hydrology by abstracting from the Headrace flows when necessary.	No	No
Kilcarren-Firville Bog SAC (86)	No significant adverse effect expected	None necessary	No	No
Liskeenan Fen SAC (87)	No significant adverse effect expected	None necessary	No	No

4.12.2.2 Option B – Lough Derg

The principal mitigation measure required to address any significant negative impact of this option on European sites relates to maintaining the flow in the River Shannon downstream of Parteen Weir at the expense of water flowing down the headrace to Ardnacrusha as discussed in Option A.

With respect to residence time, it is not expected that the increase in retention time will result in a significant adverse impact on the European sites. Whilst this options will not result in a significant adverse impact on a the European sites, further baseline investigations shall be undertaken to allow accurate operational monitoring and these measures are outlined in **Section 5**.

Options F1 and F2 is an alternative option proposed to take into account the possible need to mitigate the effects of an increase in residence time. By abstracting water from the lake when flows are high and reducing the abstraction rate when flows are low, the effect of abstraction of residence time can be reduced. Should it be preferable to further reduce any risk of impact caused by abstraction, then Options F1 and F2 could be implemented as a mitigation measure.

Table 4.22 Mitigation Measures for Option B – Lough Derg

European Site	Potential Effect on Integrity	Mitigation Measures	Is there still a risk on integrity?	Is Stage 3 Required?
Lough Ree SAC (11), Lough Ree SPA (3)	No significant adverse effect expected	None necessary	No	No
River Shannon Callows SAC (14), Middle Shannon Callows SPA (2)	No significant adverse effect expected	None necessary	No	No
River Suck Callows SPA (1)	No significant adverse effect expected	None necessary	No	No
River Little Brosna Callows SPA (33)	No significant adverse effect expected	None necessary	No	No
Fin Lough (Offaly) SAC (15)	No significant adverse effect expected	None necessary	No	No
Lough Forbes Complex SAC (23)	No significant adverse effect expected	None necessary	No	No
Lough Derg, North East Shore SAC (80), Lough Derg SPA (31)	No significant adverse effect expected	None necessary	No	No
Lower River Shannon (65)	Alteration to hydrology	Prevent any significant alteration to the existing hydrology by abstracting from the Headrace flows when necessary.	No	No
River Shannon and River Fergus Estuaries SPA (29)	No significant adverse effect expected	None necessary	No	No
Cloonmoylan Bog SAC (78)	No significant adverse effect expected	None necessary	No	No
Barroughter	No significant adverse effect expected	None necessary	No	No

European Site	Potential Effect on Integrity	Mitigation Measures	Is there still a risk on integrity?	Is Stage 3 Required?
Bog SAC (79)				
Redwood Bog SAC (82)	No significant adverse effect expected	None necessary	No	No
All Saints Bog and Esker SAC (83), All Saints Bog SPA (34)	No significant adverse effect expected	None necessary	No	No
Mongan Bog SAC (16)/SPA (4)	No significant adverse effect expected	None necessary	No	No
Kilcarren-Firville Bog SAC (86)	No significant adverse effect expected	None necessary	No	No
Liskeenan Fen SAC (87)	No significant adverse effect expected	None necessary	No	No

4.12.2.3 Option C – Parteen Basin

Mitigation measures for this option relate mainly to maintaining the flow downstream of the Parteen Weir as discussed above under Option A. It is also important that an appropriate design be put forward for the design of the abstraction structure to reduce or remove the risk of the entrainment and/or impingement of fish species migrating past the intake point. This would need to be done in consultation with the fisheries board.

Table 4.23 Mitigation Measures for Option C – Parteen Basin

European Site	Potential Effect on Integrity	Mitigation Measures	Is there still a risk on integrity?	Is Stage 3 Required?
Lough Ree SAC (11), Lough Ree SPA (3)	No significant adverse effect expected	None necessary	No	No
River Shannon Callows SAC (14), Middle Shannon Callows SPA (2)	No significant adverse effect expected	None necessary	No	No
River Suck Callows SPA (1)	No significant adverse effect expected	None necessary	No	No

European Site	Potential Effect on Integrity	Mitigation Measures	Is there still a risk on integrity?	Is Stage 3 Required?
River Little Brosna Callows SPA (33)	No significant adverse effect expected	None necessary	No	No
Fin Lough (Offaly) SAC (15)	No significant adverse effect expected	None necessary	No	No
Lough Forbes Complex SAC (23)	No significant adverse effect expected	None necessary	No	No
Lough Derg, North East Shore SAC (80), Lough Derg SPA (31)	No significant adverse effect expected	None necessary	No	No
Lower River Shannon (65)	Alteration to hydrology	Prevent any significant alteration to the existing hydrology by abstracting from the Headrace when necessary.	No	No
River Shannon and River Fergus Estuaries SPA (29)	No significant adverse effect expected	None necessary	No	No
Mongan Bog SAC/SPA (4)	No significant adverse effect expected	None necessary	No	No

4.12.2.4 Option D - Lough Ree and Lough Derg

This option was proposed as a means of mitigating any significant impact due to the implementation of Option A by phasing the abstraction with 250 Ml/d abstracted initially from Lough Ree and a further 100 Ml/d abstracted from Lough Derg as part of a later phase. The aim is to reduce the impact of the abstraction from Lough Ree on the lake itself and the river channel downstream. It does not appear possible to mitigate the likely significant effects related to this option while fulfilling the requirements of the draft Plan.

Table 4.24 Mitigation Measures for Option D – Lough Ree and Lough Derg

European Site	Potential Effect on Integrity	Mitigation Measures	Is there still a risk on integrity?	Is Stage 3 Required?
Lough Ree SAC (11), Lough Ree SPA (3)	Changes to water level	This option represents a mitigation of potential effects of Option A. The only mitigation possible involves altering abstraction rate and timing to address issues identified. Unlikely to be sufficient while still fulfilling the needs of the draft Plan.	Yes	Yes
River Shannon Callows SAC (14), Middle Shannon Callows SPA (2)	Changes to water levels and increase in low flow duration	See above mitigation measures	Yes	Yes
River Suck Callows SPA (1)	Changes to water levels and increase in low flow duration	See above mitigation measures	Yes	Yes
River Little Brosna Callows SPA (33)	Changes to water levels and increase in low flow duration	See above mitigation measures	Yes	Yes
Fin Lough (Offaly) SAC (15)	Potential changes in groundwater, further studies needed (groundwater modelling)	Not determined at this stage	Yes	Yes
Lough Forbes Complex SAC (23)	No significant adverse effect expected	None necessary	No	No
Lough Derg, North East Shore SAC (80), Lough Derg SPA (31)	Increase in residence time	See Lough Ree mitigation measures	Yes	Yes
Lower River Shannon (65)	Alteration to hydrology	Prevent any significant alteration to the existing hydrology by abstracting from the Headrace when necessary.	No	No
River Shannon and River Fergus Estuaries SPA (29)	No significant adverse effect expected	None necessary	No	No
Cloonmoylan Bog SAC (78)	No significant adverse effect expected	None necessary	No	No
Barroughter Bog SAC (79)	No significant adverse effect expected	None necessary	No	No
Redwood Bog SAC (82)	Potential changes in groundwater, further studies needed (groundwater modelling)	Not determined at this stage	Yes	Yes

All Saints Bog and Esker SAC (83) All Saints Bog SPA (34)	Potential changes in groundwater, further studies needed (groundwater modelling)	Not determined at this stage	Yes	Yes
Mongan Bog SAC (16)/SPA (4)	Potential changes in groundwater, further studies needed (groundwater modelling)	Not determined at this stage	Yes	Yes
Kilcarren-Firville Bog SAC (86)	No significant adverse effect expected	None necessary	No	No
Liskeenan Fen SAC (87)	No significant adverse effect expected	None necessary	No	No

4.12.2.5 Option E – Lough Ree and Storage

Option E itself can be considered a form of mitigation in that its purpose is to reduce any likely significant adverse effect due to year-round abstraction from Lough Ree on the habitats and species of the lake the River Shannon downstream of Athlone, Lough Derg, etc. As abstraction would occur at a higher rate when river flows are high and a lower rate when flows are low, the impact of abstraction on the duration of low flows and the residence time in Lough Derg would be reduced. It does not appear possible to mitigate the likely significant effects related to this option while fulfilling the requirements of the Draft Plan. The precautionary principle has been applied for the appropriate assessment of this option, however the impacts of this Option are less severe than those outlined for Option A. Therefore with the undertaking of further baseline investigations (as detailed in **Section 5**) it could be concluded that this option may not have a significant impact on the integrity of the European sites.

Table 4.25 Mitigation Measures for Option E – Lough Ree and Storage

European Site	Potential Effect on Integrity	Mitigation Measures	Is there still a risk on integrity?	Is Stage 3 Required?
Lough Ree SAC (11), Lough Ree SPA (3)	Changes to water level	This option represents a mitigation of potential effects of Option A. Only mitigation possible involves altering abstraction rate and timing to address issues identified. Unlikely to be sufficient while still fulfilling the needs of the draft Plan.	Yes	Yes
River Shannon Callows SAC (14), Middle Shannon Callows SPA (2)	Changes to water levels and increase in low flow duration	See Lough Ree mitigation measures	Yes	Yes
River Suck Callows SPA (1)	Changes to water levels and increase in low flow duration	See Lough Ree mitigation measures	Yes	Yes

European Site	Potential Effect on Integrity	Mitigation Measures	Is there still a risk on integrity?	Is Stage 3 Required?
River Little Brosna Callows SPA (33)	Changes to water levels and increase in low flow duration	See Lough Ree mitigation measures	Yes	Yes
Fin Lough (Offaly) SAC (15)	Potential changes in groundwater, further studies needed (groundwater modelling)	Not determined at this stage	Yes	Yes
Lough Forbes Complex SAC (23)	No significant adverse effect expected	None necessary	No	No
Raheenmore Bog SAC (38)	Alteration to hydrology and transfer of invasive species	Ensure storage area hydrology remains separate from surrounding hydrology. Eliminate invasive species from piped water before transfer	No	No
Lough Derg, North East Shore SAC (80), Lough Derg SPA (31)	Increase in residence time	See Lough Ree mitigation measures	Yes	Yes
Lower River Shannon (65)	Alteration to hydrology	Prevent any significant alteration to the existing hydrology by abstracting from the Headrace when necessary.	No	No
River Shannon and River Fergus Estuaries SPA (29)	No significant adverse effect expected	None necessary	No	No
Cloonmoylan Bog SAC (78)	No significant adverse effect expected	None necessary	No	No
Barroughter Bog SAC (79)	No significant adverse effect expected	None necessary	No	No
Redwood Bog SAC (82)	Potential changes in groundwater, further studies needed (groundwater modelling)	Not determined at this stage	Yes	Yes
All Saints Bog and Esker SAC (83) All Saints Bog SPA (34)	Potential changes in groundwater, further studies needed (groundwater modelling)	Not determined at this stage	Yes	Yes
Mongan Bog SPA (4)	Potential changes in groundwater, further studies needed (groundwater modelling)	Not determined at this stage	Yes	Yes
Kilcarren-Firville Bog SAC (86)	No significant adverse effect expected	None necessary	No	No
Liskeenan Fen SAC (87)	No significant adverse effect expected	None necessary	No	No

Option F1 – Lough Derg and Storage

This option is a variation on Option B, as it involved abstraction from Lough Derg for only part of the year and the provision of bog land storage to cover the low flow period. This option was proposed as a form of mitigation in order to reduce the impact of abstraction on residence time in Lough Derg. As this option provides greater operational flexibility it represents a better option than Option B from an ecological perspective.

Table 4.26 Mitigation Measures for Option F1 – Lough Derg and Storage

European Site	Potential Effect on Integrity	Mitigation Measures	Is there still a risk on integrity?	Is Stage 3 Required?
Lough Ree SAC (11), Lough Ree SPA (3)	No significant adverse effect expected	None necessary	No	No
River Shannon Callows SAC (14), Middle Shannon Callows SPA (2)	No significant adverse effect expected	None necessary	No	No
River Suck Callows SPA (1)	No significant adverse effect expected	None necessary	No	No
River Little Brosna Callows SPA (33)	No significant adverse effect expected	None necessary	No	No
Fin Lough (Offaly) SAC (15)	No significant adverse effect expected	None necessary	No	No
Lough Forbes Complex SAC (23)	No significant adverse effect expected	None necessary	No	No
Raheenmore Bog SAC (38)	Alteration to hydrology and transfer of invasive species	Ensure storage area hydrology remains separate from surrounding hydrology. Eliminate invasive species from piped water before transfer	No	No
Lough Derg, North East Shore SAC (80), Lough Derg SPA (31)	Increase in residence time	None necessary	No	No
Lower River Shannon (65)	Alteration to hydrology	Prevent any significant alteration to the existing hydrology by abstracting from the Headrace when necessary.	No	No
River Shannon and River	No significant adverse effect expected	None necessary	No	No

European Site	Potential Effect on Integrity	Mitigation Measures	Is there still a risk on integrity?	Is Stage 3 Required?
Fergus Estuaries SPA (29)				
Cloonmoylan Bog SAC (78)	No significant adverse effect expected	None necessary	No	No
Barroughter Bog SAC (79)	No significant adverse effect expected	None necessary	No	No
Redwood Bog SAC (82)	No significant adverse effect expected	None necessary	No	No
All Saints Bog and Esker SAC (83) All Saints Bog SPA (34)	No significant adverse effect expected	None necessary	No	No
Mongan Bog SPA (4)	No significant adverse effect expected	None necessary	No	No
Kilcarren-Firville Bog SAC (86)	No significant adverse effect expected	None necessary	No	No
Liskeenan Fen SAC (87)	No significant adverse effect expected	None necessary	No	No

4.12.2.6 Option F2 – Lough Derg and Storage

This option is a variation on Option B, as it involved abstraction from Lough Derg for only part of the year and the provision of bog land storage to cover the low flow period. This option was proposed as a form of mitigation in order to reduce the impact of abstraction on residence time in Lough Derg. As this option provides greater operational flexibility it represents a better option than Option B from an ecological perspective.

Table 4.27 Mitigation Measures for Option F2 – Lough Derg and Storage

European Site	Potential Effect on Integrity	Mitigation Measures	Is there still a risk on integrity?	Is Stage 3 Required?
Lough Ree SAC (11), Lough Ree SPA (3)	No significant adverse effect expected	None necessary	No	No
River Shannon Callows SAC (14), Middle Shannon Callows SPA (2)	No significant adverse effect expected	None necessary	No	No
River Suck Callows SPA (1)	No significant adverse effect expected	None necessary	No	No
River Little Brosna Callows SPA (33)	No significant adverse effect expected	None necessary	No	No
Fin Lough (Offaly) SAC (15)	No significant adverse effect expected	None necessary	No	No
Lough Forbes Complex SAC (23)	No significant adverse effect expected	None necessary	No	No
Lough Derg, North East Shore SAC (80), Lough Derg SPA (31)	Increase in residence time	None necessary	No	No
Lower River Shannon (65)	Alteration to hydrology	Prevent any significant alteration to the existing hydrology by abstracting from the Headrace when necessary.	No	No
River Shannon and River Fergus Estuaries SPA (29)	No significant adverse effect expected	None necessary	No	No
Cloonmoylan Bog SAC (78)	No significant adverse effect expected	None necessary	No	No
Barroughter Bog SAC (79)	No significant adverse effect expected	None necessary	No	No
Redwood Bog SAC (82)	No significant adverse effect expected	None necessary	No	No
All Saints Bog and Esker SAC (83) All Saints Bog SPA (34)	No significant adverse effect expected	None necessary	No	No
Mongan Bog	No significant adverse	None necessary	No	No

European Site	Potential Effect on Integrity	Mitigation Measures	Is there still a risk on integrity?	Is Stage 3 Required?
SPA (4)	effect expected			
Kilcarren-Firville Bog SAC (86)	No significant adverse effect expected	None necessary	No	No
Liskeenan Fen SAC (87)	No significant adverse effect expected	None necessary	No	No
River Barrow and River Nore	Alteration to hydrology and transfer of invasive species	Ensure storage area hydrology remains separate from surrounding hydrology. Eliminate invasive species from piped water before transfer.	No	No

4.12.2.7 Option G – Lough Ree and Impoundment

Similar to Option E and F1 & 2, this option aimed to reduce any likely significant effects on the Shannon System by storing water abstracted in times of high flow for use during low flow periods. The potential for the translocation of invasive species would need to be addressed at source, with the abstracted water treated to ensure that no viable life-stages of invasive plants or animals could be carried across the country via the transmission pipelines.

While it may be possible the mitigate against the transfer of invasive species, it does not appear possible to mitigate the other likely significant effects related to this option in the Shannon System while fulfilling the requirements of the draft Plan.

The precautionary principle has been applied for the appropriate assessment of this option, however the impacts of this Option are less severe than those outlined for Option A. Whilst this options will not result in a significant adverse impact on a the European sites, further baseline investigations shall be undertaken to allow accurate operational monitoring and these measures are outlined in **Section 5**.

Table 4.28 Mitigation Measures for Option G – Lough Derg and Storage

European Site	Potential Effect on Integrity	Mitigation Measures	Is there still a risk on integrity?	Is Stage 3 Required?
Lough Ree SAC (11), Lough Ree SPA (3)	Changes to water level	This option represents a mitigation of potential effects of Option A. Only mitigation possible involves altering abstraction rate and timing to address issues identified. Unlikely to be sufficient while still fulfilling the needs of the draft Plan.	Yes	Yes
River Shannon Callows SAC (14), Middle Shannon Callows SPA (2)	Changes to water levels and increase in low flow duration	See Lough Ree mitigation measures	Yes	Yes
River Suck Callows SPA (1)	Changes to water levels and increase in low flow duration	See Lough Ree mitigation measures	Yes	Yes
River Little Brosna Callows SPA (33)	Changes to water levels and increase in low flow duration	See Lough Ree mitigation measures	Yes	Yes
Fin Lough (Offaly) SAC (15)	Potential changes in groundwater, further studies needed (groundwater modelling)	Not determined at this stage	Yes	Yes
Lough Forbes Complex SAC (23)	No significant adverse effect expected	None necessary	No	No
Lough Derg, North East Shore SAC (80), Lough Derg SPA (31)	Increase in residence time	See Lough Ree mitigation measures	Yes	Yes
Lower River Shannon (65)	Alteration to hydrology	Prevent any significant alteration to the existing hydrology by abstracting from the Headrace when necessary.	No	No
River Shannon and River Fergus Estuaries SPA (29)	No significant adverse effect expected	None necessary	No	No
Glenasmole Valley SAC (63)	Alteration to hydrology and transfer of invasive species	Ensure storage area hydrology remains separate from surrounding hydrology. Eliminate invasive species from piped water before transfer.	No	No
Poulaphouca Reservoir SPA (37)	Alteration to hydrology and transfer of invasive species	Ensure storage area hydrology remains separate from surrounding hydrology. Eliminate invasive species from piped water before transfer.	No	No

European Site	Potential Effect on Integrity	Mitigation Measures	Is there still a risk on integrity?	Is Stage 3 Required?
Wicklow Mountains SAC (64), SPA (38)	Alteration to hydrology and transfer of invasive species	Ensure storage area hydrology remains separate from surrounding hydrology. Eliminate invasive species from piped water before transfer.	No	No
Cloonmoylan Bog SAC (78)	Reduction in discharge	None necessary	No	No
Barroughter Bog SAC (79)	No significant adverse effect expected	None necessary	No	No
Redwood Bog SAC (82)	Potential changes in groundwater, further studies needed (groundwater modelling)	Not determined at this stage	Yes	Yes
All Saints Bog and Esker SAC (83) All Saints Bog SPA (34)	Potential changes in groundwater, further studies needed (groundwater modelling)	Not determined at this stage	Yes	Yes
Mongan Bog SAC (16)/SPA (4)	Potential changes in groundwater, further studies needed (groundwater modelling)	Not determined at this stage	Yes	Yes
Kilcarren-Firville Bog SAC (86)	No significant adverse effect expected	None necessary	No	No
Liskeenan Fen SAC (87)	No significant adverse effect expected	None necessary	No	No

4.12.2.8 Option H

The potential significant effects of this option relate to the disturbance to seals caused by the carrying out of acoustic surveys and the likelihood of causing increased phytoplankton growth. By entering into consultation with the NPWS and, if necessary, adhering to the Code of Conduct for the Protection of Marine Mammals during Acoustic Seafloor Surveys in Irish Waters (NPWS, 2007) the risk of causing disturbance to seals in the area can be minimised.

In relation to the potential for increased phytoplankton growth, sludge disposal should not take place at sea with the brine discharge, but rather the sludge should be disposed of on land. This will prevent effects on the phytoplankton community induced by the addition of iron to the water column. Whilst this options will not result in a significant adverse impact on a the European sites, further baseline investigations shall be undertaken to allow accurate operational monitoring and these measures are outlined in **Section 5**.

Table 4.29 Mitigation Measures for Option H – Desalination

European Site	Potential Effect on Integrity	Mitigation Measures	Is there still a risk on integrity?	Is Stage 3 Required?
Boyne Coast and Estuary SAC (51)	No significant adverse effect expected	None necessary	No	No
Lambay Island SAC (53), SPA (22)	Increase in phytoplankton growth and knock-on effect on food chain	Dispose of sludge on land rather than via dispersal with brine solution	No	No
Rogerstown Estuary SAC (52), SPA (21)	No significant adverse effect expected	None necessary	No	No
Malahide Estuary SAC (54)	No significant adverse effect expected	None necessary	No	No
Baldoyle Bay SAC (55), SPA (24)	No significant adverse effect expected	None necessary	No	No
Skerries Islands SPA (20)	Increase in phytoplankton growth and knock-on effect on food chain	Dispose of sludge on land rather than via dispersal with brine solution	No	No
Rockabill SPA (19)	Increase in phytoplankton growth and knock-on effect on food chain	Dispose of sludge on land rather than via dispersal with brine solution	No	No
Irelands Eye SAC (56), SPA (25)	No significant adverse effect expected	None necessary	No	No

4.13 STAGE 2 - CONCLUSION

Table 4.37 states the conclusions of Stage 2 of the Habitats Directive Assessment. Options B, C, F1, F2 and H do not have a risk on the integrity of European sites. Options A and D do not meet the appropriate assessment test even after mitigation measures have been outlined and therefore they are options that the draft Plan cannot adopt. Options E and G were not conclusive and therefore the precautionary principle was applied. **Table 4.38** outlines the further studies that would be required for Options E and G if they were to be pursued further.

Option A – Lough Ree

The result of the assessment indicates that the abstraction from Lough Ree will result in an alteration to water levels, low flow period duration and retention times in Lough Derg. The water level and flow impacts are considered to constitute a likely significant adverse impact on European sites. It is therefore concluded that Option A will adversely affect the integrity of European sites.

Option B – Lough Ree

The principal impact of Option B is the increased residence time in Lough Derg. Investigations to date have indicated that this does not constitute a likely significant adverse impact upon Lough Derg. It is therefore concluded that Option B will not adversely affect the integrity of European sites.

Option C - Parteen

Once the hydrological regime of the Lower River Shannon is maintained as outlined in the mitigation section, there will be no likely significant adverse effect on Lough Derg and other European sites affected by this option. It is therefore concluded that Option C will not adversely affect the integrity of European sites.

Option D – Lough Ree and Lough Derg

The result of the assessment indicates that the abstraction of water from Lough Ree will still result in significant alteration to water levels and low flow period duration. These impacts are considered to constitute a likely significant adverse impact on European sites. It is therefore concluded that Option D will adversely affect the integrity of European sites.

Option E – Lough Ree and Storage

Option E is proposed to mitigate against the adverse effects of Options A and D. While target levels and minimum operating levels are achieved under this option, there remains uncertainty in relation to the extent of the impact of lower water levels and prolonged low flow. It is uncertain whether these impacts are considered to constitute a likely significant adverse impact on European sites and further studies would be required which may also prove inconclusive. The precautionary principle must therefore be applied.

Options F1 and F2 – Lough Derg and Storage

Options F1 and F2 offer greater operational flexibility and do not constitute a likely significant adverse impact on European sites. It is therefore concluded that Options F1 and F2 will not adversely affect the integrity of European sites.

Option G – Lough Ree/Derg and Impoundment

Option G is proposed to mitigate against the adverse effects of Options A. While target levels and minimum operating levels are achieved under this option, there remains uncertainty in relation to the extent of the impact of lower water levels and prolonged low flow. It is uncertain whether these impacts are considered to constitute a likely significant adverse impact on European sites and further studies would be required which may also prove inconclusive. The precautionary principle must therefore be applied.

Option H - Desalination

Mitigations measures have been identified to deal with the potential impacts. Once these measures are adhered to, it is considered that there will be no likely significant adverse effect on the European sites. It is therefore concluded that Option H will not adversely affect the integrity of these European sites.

The following table presents the conclusions for the appropriate assessment.

Table 4.37 Summary of Appropriate Assessment

Water Supply Option	Is there still a risk on integrity?	Is Stage 3 Required?
Option A	Yes	Yes
Option B	No	No
Option C	No	No
Option D	Yes	Yes
Option E	Yes	Yes
Option F1	No	No
Option F2	No	No
Option G	Yes	Yes
Option H	No	No

The precautionary principle has been applied to Options E and G as existing data does not provide enough certainty that to determine no risk on the integrity of a European Site. Further studies are outlined in **Section 5** and if these studies are conclusive they could alter the existing conclusion of the appropriate assessment for Options E and G. These further studies could establish whether there is a risk to the integrity of the sites.

Table 4.38 Further Studies

Water Supply Option	Further Studies Are Required (outlined in Section 6)
Option E Option G	• Establishment of Working Group • Shannon System Monitoring • Phytoplankton Dynamics • Invasive Species • Pollan Survey • Hydrological Connections • Ecological Monitoring

5 FURTHER STUDIES

5.1 INTRODUCTION

The following further studies are recommended as part of the Environmental Impact Assessment (EIA) process for the preferred option when selected.

5.2 ESTABLISH WORKING GROUP

If the preferred option emerges as one of the Shannon options an independent working group (advisory council) should be established to identify the detail of monitoring programmes, outlined in the following sections. The working group could be comprised of members of statutory bodies such as the National Parks Wildlife Service, the Regional Fisheries Boards, the Environmental Protection Agency and other relevant bodies to establish a monitoring framework.

5.3 SHANNON OPTIONS

5.3.1 Shannon System Monitoring

Monitoring equipment has already been installed in the River Shannon at Athlone in order to record discharge. Similar equipment should be considered for other locations throughout the system to gather long-term data on water levels, flows, temperature and residence times within both the rivers and lakes of the Shannon System.

For the Lower Shannon the current hydrological regime should be preserved to ensure that existing habitats tat are dependant on inundation are maintained.

Considerable work has been carried out in assessing the effects of reducing downstream flows in the river on ecological elements including habitats, macrophytes, macroinvertebrates and fish as discussed in the potential impact section see **Section 4.9**. Any abstraction from the Shannon will be done without significant change to the hydrological regime of the Lower Shannon to prevent adverse impacts on habitats and species dependant on current regimes.

5.3.2 Phytoplankton Dynamics

The possibility that changes to residence time may lead to significant changes in nutrient and phytoplankton dynamics in Lough Derg is considered unlikely. However, given the importance of the

Shannon System the situation with regard to phytoplankton should be subject to on-going monitoring. In order to address this issue adequately consistent time-series of data on nutrients and phytoplankton community (biomass and diversity) would be required. The monitoring methodology should take account of the seasonal and tidal variability as a minimum and thus the data should be collected over a minimum period of one year. Some data is being collected by the EPA as part of the requirement of the compliance with the Water Framework Directive, thus the monitoring strategy should be adjusted to build upon the existing data. Based on the time-series, biological model of the phytoplankton dynamics should be established. In order to be reliable, the model would also have to take into account to-down control and account for the grazing pressure. The zebra mussel is considered one of the dominant factors in the nutrient dynamics of the lake and their filtering capacity within the study area under different abstraction options should be addressed and factored into the phytoplankton model. Such data (time-series and biological model) would allow more accurate prediction of the biological effects of the proposed abstraction scheme.

5.3.3 Ecological Monitoring

For Options E and G, in light of the HDA findings, studies will be required in advance of these options being considered for adoption. These studies will comprise assessment of shoreline and riparian communities along the Shannon System and their response to the modified hydrological regime. This should take account of the existing fluctuations within the system, thus investigations into the response of shoreline communities should be undertaken.

5.3.4 Pollan Survey

Pollan is an endangered species recorded in the past on the Shannon system. Concerns have been raised as to the pollan stocks in Lough Derg and Lough Ree. The possible effects of water abstraction on its stocks will have to be addressed adequately and this is not possible with the limited knowledge there is at present. A pollan survey would have to be carried out in the Lough Ree and / or Lough Derg should these options be chosen.

5.3.5 Ecological Study on Bog Options E, F1 and F2

An ecological study should be commissioned in order to examine the possibilities for ecological design, fisheries, habitats recreation area etc for options involving bog storage. The development of the storage area should be designed with reference to the environmental management plan for Lough Boora Parklands, Co. Offaly (Bord na Móna). Emphasis should be placed on creating a mosaic of semi-natural habitats appropriate to the cutaway bog land through natural regeneration. An environmental management plan will be developed for any bog storage option.

5.3.6 Hydrological Connections

Options E, and G have potential to impact on a number of sites supporting groundwater dependent habitats. The hydrological connections between the Shannon system and the European sites would require further investigation. Therefore groundwater models will have to be developed to ensure there is no alteration to the existing hydrological regime for the following European sites: Redwood Bog SAC, All Saints Bog and Esker SAC, All Saints Bog SPA, Mongan Bog SAC / SPA and Fin Lough (Offaly) SAC.

5.4 DESALINATION OPTION

5.4.1 Baseline Surveys

In the event of desalination emerging as the preferred option baseline surveys on the marine area in the vicinity of the intake and outfall structures should be carried out. These surveys should include; ROV (remote operated vehicle) survey, macroinvertebrate survey and sediment quality. The data on the water column profile already collected should be built upon in order to detect natural trends and fluctuations in the area in the parameters such as: salinity, dissolved oxygen, temperature, water currents (currents can be different at various depths). In addition depth of the photic zone (light penetration), primary productivity (chlorophyll a) and phytoplankton composition should be monitored. The monitoring methodology should take account of the seasonal and tidal variability as a minimum and thus the data should be collected over a minimum period of one year.

5.4.2 Feasibility Study on Disposal of Sludge

For the desalination option a feasibility study will be required to determine the range of possibilities for disposal of sludge to avoid impacts on the European Sites as per the HDA.

6 GLOSSARY

Appropriate Assessment: An assessment of the affect of a plan or a project on the Natura 2000 network. The network comprises Special Protection Areas under the Birds Directive and Special Areas of Conservation under the Habitats Directive (collectively referred to as European Sites).

Avoidance: Prevents impacts on European sites from happening in the first place.

Conservation Objectives: A statement of the nature conservation aspirations for a site, expressed in terms of the favourable condition required for the habitats and/or species for which the site was selected.

European sites: Special Protection Areas (SPAs), Special Areas of Conservation (SACs).

Favourable condition: Designated land is adequately conserved and is meeting its 'conservation objectives', however, there is scope for enhancement.

Habitats Directive: Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna.

Imperative reasons of overriding public interest (IROPI): The Habitats Regulations require competent authorities to establish that there are no alternative solutions before a plan or project can be considered for imperative reasons of overriding public interest. Judgements will involve an assessment of the importance of the proposal and whether it is sufficient to override the nature conservation importance of that site.

Integrity: The integrity of a site is the coherence of its ecological structure and function, across its whole area that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified.

Mitigation: Reduces the impact on site integrity to the point where it no longer has adverse effects.

Precautionary principle: Prudent action which avoids the possibility of irreversible environmental damage in situations where the scientific evidence is inconclusive but the potential damage could be significant.

Priority Habitat/Species: Habitats and species identified by the Habitats Directive as being of priority importance.

Qualifying Interest Feature: The reasons why the European site has been recommended for designation (e.g. the endangered species that occupy the SAC; rare habitats that occur there; or threatened birds that breed or over-winter in SPA).

Ramsar sites: Sites designated as internationally important wetland habitats under the International Convention on Wetlands of International Importance (1976) (Ramsar Convention).

Screening: The process of deciding whether or not a plan or project requires an Appropriate Assessment designated as Special Areas of Conservation (SACs), Special Protection Areas (SPAs) or Ramsar sites.

7 REFERENCES

Acreman, M.C., Dunbar, M.J., Hannaford, J., Bragg, O.M., Black, A.R., Rowan, J.S. and King, J. (2006). Development of Environmental Standards (Water Resources) Stage 3: Environmental Standards. SNIFFER Final Report WFD48

Anonymous (2007). Irish Pollan: County Clare Species Action Plan. Draft Action Plan. Unpublished.

Barnthouse, L.W., (2000). Impacts of power-plant cooling systems on estuarine fish populations: the Hudson River after 25 years. Environmental Science and Policy, 3: 341-348.

Beintema, A.J., Beintema-Hietbrink, R.J. & Muskens, G.J.D.M. (1985). A shift in timing of breeding in meadow birds. Ardea 73, 83-89.

BirdLife International. (2004). Birds in Europe: population estimates, trends and conservation status. BirdLife International Conservation Series 12, Cambridge, UK.

Bonacci, O., Kerovec, M., Roje-Bonnaci, T., Mrakovic, M. and Plenkovic-Moraj, E. (1998). Ecologically acceptable flows definition for the Žrnovnica River (Croatia). Regulated Rivers: Research and Management, 14: 245-256.

Bowman, J.J. (1996). Lower Shannon Basin - Athlone to Killaloe. In J.D. Reynolds (ed.) The Conservation of Aquatic Systems: 20-30. Royal Irish Academy, Dublin.

Bowman, J.J. (2000) River Shannon: lake water quality monitoring 1998-1999. Environmental Protection Agency, Johnstown Castle, Co. Wexford.

Brett, M.T. and Benjamin, M.M. (2008). A review and reassessment of lake phosphorus retention and the nutrient loading concept. Freshwater Biology, 53: 194-211.

Brook, A. J. and Woodward, W. B. (1956). Some observations on the effects of water inflow and outflow on the plankton of small lakes. Journal of Animal Ecology, 25: 22.

Brunke, M., Hoffmann, A. and Pusch, M. (2001). Use of mesohabitat-specific relationships between flow velocity and river discharge to assess invertebrate minimum flow requirements. Regulated Rivers: Research & Management. 17: 667-676.

Burton, N.H.K., Rehfisch, M.M. & Clark, N.A. (2002). Impacts of disturbance from construction work on the densities and feeding behaviour of waterbirds using the intertidal mudflats of Cardiff Bay, UK. Environmental Management, 30, 865-871

Carter, L.K. and Reader, P.J. (2000). Patterns of drift and power station entrainment of. 0+ fish in the River Trent, England. Fisheries Management and Ecology, 7: 447-464.

Casanova, M.T. & Brock, M.A. (2000). How do depth, duration and frequency of flooding influence the establishment of wetland plant communities? Plant Ecology, 147, 237-250.

Chow-Fraser, P. and Duthie, H.C. (1983) An interpretation of phosphorus loadings in dystrophic lakes. Archiv fur Hydrobiologie 97: 109-121.

Commission of the European Communities v United Kingdom of Great Britain and Northern Ireland. Case C-6/04,Opinion of the Advocate in the European Court of Justice. Failure of a Member State to fulfil obligations -- Directive 92/43/EEC -- Conservation of natural habitats -- Wild fauna and flora. (9 June 2005).

Conway, V.M. (1942). Biological flora of the British Isles: Cladium mariscus (L). Journal of Ecology, 30, 211-16

Council of the European Communities (1992). Council Directive of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (92/43/EEC). O.J. L 206/35, 22 July 1992.

Crowe, O. (2005). Irelands Wetlands and their Waterbirds: Status and Distribution. BirdWatch Ireland, Newcastle. Wicklow.

Cullen, R. (2002). Shannon water level management. Inland Waterways News. 29(3).

Curtis, T.G.F. and McGough, H.N. (1988) The Irish Red Data Book 1: Vascular Plants. Stationery Office, Dublin.

Department of the Environment Heritage and Local Government. Circular Letter PD 2/07 and NPWS 1/07, Compliance Conditions in respect of Developments requiring (1) Environmental Impact Assessment (EIA); or (2) having potential impacts on Natura 2000 sites. Author: Phillip Nugent , Assistant Planning Officer, Planning Section.

Department of the Environment Heritage and Local Government. (15 February 2008). Circular Letter SEA 1/08 and NPWS 1/08, Appropriate Assessment of Land Use Plans. Author: Peter Carvill, Assistant Principal.

Department of the Environment Heritage and Local Government. Circular Letter PD 2/07 and NPWS 1/07, Compliance Conditions in respect of Developments requiring (1) Environmental Impact Assessment (EIA); or (2) having potential impacts on Natura 2000 sites. Author: Phillip Nugent , Assistant Planning Officer, Planning Section,

Donald, P.F., Green, R.E. & Heath, M.F. (2001). Agricultural intensification and the collapse of Europe's farmland bird population. Proceeding of the Royal Society of London B 268, 25-29

Doogue, D., Nash, D., Parnell, J., Reynolds, S. and Wise Jackson, P. (1998) Flora of County Dublin. The Dublin Naturalists' Field Club.

Elliott, J. A. and Jones, I.D. (2006). Investigating the effect of changing retention time in natural and artificial water bodies - simulations using PROTECH-D. Centre for Ecology and Hydrology.

European Commission (2000) Managing Natura 2000 sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC. European Commission, Brussels.

European Commission (2001) Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC.

European Commission (2001). Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC. European Commission, Brussels.

European Commission (2007). Guidance document on Article 6(4) of the 'Habitats Directive' 92/49/EEC; clarification of the concepts of: Alternative solutions, Imperative reasons of overriding public interest, Compensatory Measures, Overall Coherence, Opinion of the Commission. European Commission, Brussels.

Finney, K., Lynch, A., Copland, A. (2007) The NPWS Shannon Callows Breeding Wader Management Report 2007. Unpublished Report, Birdwatch Ireland/NPWS.

Furey, P. C., Nordin, R. N. and Mazumder, A. (2006). Littoral benthic macroinvertebrates under contrasting drawdown in a reservoir and a natural lake. Journal of the North American Benthological Society, 25: 19-31.

Gibbins, C.N. and Acornley, R.M. (2000). Salmonid habitat modelling studies and their contribution to the development of an ecologically acceptable release polity for Kielder Reservoir, North-east England. Regulated Rivers: Research & Management. 16: 203-224.

Gilvear, D.J. & Bradley, C. (2000). Hydrological monitoring and surveillance of wetland conservation and management; a UK perspective. Physics and Chemistry of the Earth (Part B): Hydrology, Oceans and Atmosphere, 25, 571-588.

Gilvear, D.J. and Bradley, C.J. (2000), Hydrological monitoring and Assessment for wetland conservation and management. Physics and Chemistry of the Earth

Goodwillie, R. and Fahy, E. (1973) A Preliminary Report on Areas of Scientific Interest in Dublin. An Foras Forbartha Teoranta, The National Institute for Physical Planning and Construction Research. Dublin.

Green, R.E., Williams, G. (1994) The ecology of the corncrake Crex crex and action for its conservation in Britain and Ireland. - In: Bignal, E. & Curtis, D.J. (Eds) Nature Conservation and Pastoralism in Europe, Proceedings of the third European Forum, JNCC, Peterborough: 69-74.

Hadderingh, R.H. and Jager, Z. (2002). Comparison of fish impingement by a thermal power station with fish populations in the Ems Estuary. Journal of Fish Biology, 61: 105-124.

Haslam, S.M, (1965). Ecological studies in Breck fens. I. Vegetation in relation to habitat. Journal of Ecology, 53, 599-619

Havens, K.E., Sharfstein, B., Brady, M.A., East, T.L., Harwell, M.C., Maki, R.P. and Rodusky, A.J. (2004). Recovery of submerged plants from high water stress in a large subtropical lake in Florida, USA. Aquatic Botany, 78: 67-82.

Heery, (2003). Callows and floodplains. In: Life in wetland environments. In: Wetlands of Ireland. (ed. M. Otte). University College Dublin Press, Dublin

Heery, S. (1993). The Shannon floodlands - a natural history of the Shannon callows. Tír Eolas, Kinvara.

Heery, S. (1995). Flooding in spring on the callows at Shannon Harbour, 1961 - 94. Biology and Environment: Proceeding of the Royal Irish Academy, Vol. 95B, No.3, 179-182.

Heery, S. (2003). Callows and floodplains. In: Life in wetland environments. In: Wetlands of Ireland. (ed. M. Otte). University College Dublin Press, Dublin.

Holmes, N.T.H. (1999). Recovery of headwater stream flora following the 1989-1992 groundwater drought. Hydrological Processes: 13: 341-354.

A. Hooijer (1996). Floodplain hydrology. PhD thesis Vrije Universiteit, Amsterdam.

Jackson, T.A. and Hecky, R.E. (1980) Depression of primary productivity by humic matter in lake and reservoir waters of the boreal forest zone. Canadian Journal of Fisheries and Aquatic Sciences. 37:2300-2317.

Jones, I. D. and Elliot, J. A. (2007) Modelling the effects of changing retention time on abundance and composition of phytoplankton species in a small lake, Freshwater Biology, 52: 988-997.

Jones, R.I. (1990) Phosphorus transformations in the epilimnion of humic lakes: biological uptake of phosphorus. Freshwater Biology 23:323-337.

Karenge, L.P. and Kolding, J. (1995). On the relationship between hydrology and fisheries in Lake Kariba, central Africa. Fisheries Research, 22: 205-226.

Kaster, J.L. and G. Jacobi. (1978). Benthic macroinvertebrates of a fluctuating reservoir. Freshwater Biology, 8: 283-290.

Keedy, P.A. & Ellis, T.H. (1985). Seedling recruitment of 11 wetland plant species along a water level gradient: shared or distinct responses? Canadian Journal of Botany, 63, 1876-1879.

Keedy, P.A. (1983). Shoreline vegetation in Axe Lake, Ontario: effects of exposure on zonation patterns. Ecology, 64, 331-344.

Keedy, P.A. (2000). Wetland Ecology, Principles and Conservation. Cambridge University Press, Cambridge.

Kelso, J.R.M., and G.S. Milburn. (1979). Entrainment and impingement of fish by power plants in the Great Lakes which use the once-through cooling process. Journal of Great Lakes Research, 5: 182-194.

Kiely, O., Ligard, D., McKibben, M., Connolly, N. and Baines, M. (2000) Grey Seals: Status and Monitoring in the Irish and Celtic Seas. Maritime Ireland/ Wales INTERREG Report No. 3

Kraft, M.E. (1972) Effects of controlled flow reduction on a trout stream. Journal of the Fisheries Research Board of Canada, 29: 1405-1411

Labry, C., Herbland, A. and Delmas, D. (2002). The role of phosphorus on planktonic production of the Gironde plume waters in the Bay of Biscay. Journal of Plankton Research 24: 97-117.

Lewis, R.B. and Seegert, G. (2000). Entrainment and impingement studies at two power plants on the Wabash River in Indiana. Environmental Science and Policy 3: 303-312.

Lynas, P., Newton, S.F., & Robinson, A. (2007). The status of birds in Ireland: an analysis of conservation concern 2008 -1013. Irish Birds 8: 149-166.

Lynch, A., Dennison, H., Finney, K., Copland, A. (2007) Shannon Callows breeding Wader Research Project; Final report, 2007. BirdWatch Ireland/NPWS.

Newton, S., DonaghyTurnpenny et al 1998 fish, A., Allen, D. and Gibbons, D. (1999) Birds of Conservation Concern in Ireland. Irish Birds 6: 333-344.

NPWS (2005). National Parks and Wildlife Service Conservation Plan for 2006-2011 Fin Lough Csac Site Code 576, Co. Offaly. Dept. of Environment, Heritage and Local Government.

NPWS (2007). Code of practice for the protection of marine mammals during acoustic seafloor surveys in Irish waters.

Ó Cadhla, O., Strong, D., O'Keeffe, C., Coleman, M., Cronin, M., Duck, C., Murray, T., Dower, P., Nairn, R., Murphy, P., Smiddy, P., Saich, C., Lyons,D., and Hiby L. (In press) Grey seal breeding population assessment in the Republic of Ireland, 2005. National Parks and Wildlife Service.

Official Journal of the European Union (23 October 2004) Judgement of the European Court of Justice. Case 127/02.

Otte, M. (2003). Life in wetland environments. In: Wetlands of Ireland (ed M. Otte), pp. 20-27. University College Dublin Press, Dublin.

Paillison, J.M. and Marion, L. (2006) Can small water level fluctuations affect the biomass of Nymphaea alba in large lakes? Aquatic botany, 84: 259-266

Peterson, J.E. & Baldwin, A.H. (2004). Seedling emergence from seed banks of tidal freshwater wetlands: response to inundation and sedimentation. Aquatic Botany, 78, 243-254.

Pezeshki, S.R. (2001). Wetland plant responses to soil flooding. Environmental and Experimental Botany, 46, 299-312.

Preston, C.D. and Croft, J.M. (1997) Aquatic Plants in Britain and Ireland. Harley Books, Colchester.

Riis, T. & Hawes, I. (2002). Relationships between water level fluctuations and vegetation diversity in shallow water of New Zealand lakes. Aquatic Botany, 74, 133-148.

Rosell, R., Harrod, C., Griffiths, D and McCarthy, T.K. (2004). Conservation of the Irish populations of the Pollen Coregonus autumnalis. Proceedings of the Royal Irish Academy 104B(3): 67-72

Rosell, R.S. (1997). The status of pollan Coregonus autumnalis pollan Thompson in Lough Erne, Northern Ireland. Biology and Environment: Proceedings of the Royal Irish Academy, 97B: 163-171.

Rosell, R.S., Maguire, C.M. and McCarthy, T.K. (1999). First reported settlement of zebra mussels Dreissena polymorpha in the Erne System, Co. Fermanagh, Northern Ireland. Biology and Environment: Proceedings of the Royal Irish Academy 98B(3): 191-193

Ryther, J. H. and Dunstan, W.M. (1971). Nitrogen, Phosphorus, and Eutrophication in the Coastal Marine Environment. Science 171: 1008 - 1013.

Scott Wilson, Levett-Therivel Sustainability Consultants, Treweek Environmental Consultants and Land Use Consultants (September 2006). Appropriate Assessment of Plans.

Strevens, A.P. (1999). Impacts of groundwater abstraction on the trout fishery of the River Piddle, Dorset; and an approach to their alleviation. Hydrological Processes, 13: 487-496.

Tennant, D.L. (1976). Instream flow regimens for fish, wildlife, recreation and related environmental resources. Fisheries, 1: 6-10.

Thorstad, E. B., Fiske, P., Aarestrup, K., Hvidsten, N. A., Hårsaker, K., Heggberget, T. G. and Økland, F. (2005). Upstream migration of Atlantic salmon in three regulated rivers. In Spedicato, M.T. Lembo, G. and Marmulla, G. (eds.): Aquatic telemetry: advances and applications. Proceedings of the Fifth Conference on Fish Telemetry held in Europe. Ustica, Italy, 9-13 June 2003. Rome, FAO/COISPA, 295p.

Tierney, D.T., Hudson, J. & Casey, C. (2002). Survey of breeding waders on the River Shannon Callows, 2002. Irish Birds 7, 21-32

Toner, P., Bowman, J., Clabby, K. , Lucey, J., McGarrigle, M., Concannon, C, Clenaghan, C., Cunningham, P., Delaney, J., O'Boyle, S., MacCárthaigh, M., Craig, M. and Quinn, R. (2005) Water quality in Ireland 2001-2003. Environmental Protection Agency. Johnstown Castle, Ireland.

Tubridy, M. 1984. Creation and Management of a Heritage Zone at Clonmacnoise, County Offaly,

Turnpenny, A.W.H. (1988). Fish impingement at estuarine power stations and its significance to commercial fishing. Journal of Fish Biology, 33: 103-110.

van der Valk, A.G. & Davis, C.B. (1978). Role of the seed bank in the vegetative dynamics of prairie glacial marshes. Ecology, 59, 322-335.

van der Valk, A.G. (1981). Succession in wetlands: a Gleasonian approach. Ecology, 62, 688-696.

Van Winkle, W. (ed.) (1977). Proceedings of the conference on assessing the effects of power-plant-induced mortality on fish populations. Pergamon Press, New York.

Webb, D.A., Parnell, J. and Doogue, D. (1996). An Irish Flora (7th edn). Dundalgan Press, Dundalk.

Weller, M.W. (1999). Wetland Birds: Habitat Resources and Conservation Implications. Cambridge University Press, Cambridge.

Wheeler, B.D. (1975). Phytosociological studies on rich fen systems in England and Wales. University of Durham: PhD thesis.

Willis, K.G. and Garrod, G.D. (1998). Water companies and river environments: the external costs of water abstraction. Utilities Policy, 7: 35-45.

Wills, T.C., Baker, E.A., Nuhfer, A.J. and Zorn, T.G. (2006). Response of the benthic macroinvertebrate community in a northern Michigan stream to reduced summer streamflows. River Research and Applications. 22: 819 - 836.

Wisheu, I.C., Keddy, P.A., (1991). Seed banks of rare wetland plant community, distribution patterns and effects of human induced disturbance. Journal of Vegetation Science, 2, 181-188.

Wood, P., J and Petts, G., E. (1999). The influence of drought on chalk stream macroinvertebrates. Hydrological Processes 13: 387-399.

Wood, P.J., Armitage, P.D., Cannan, C.E. and Petts, G.E. (1999). Instream mesohabitat biodiversity in three groundwater streams under base-flow conditions. Aquatic Conservation: Marine and Freshwater Ecosystems, 9: 265-278.

Wright, J.F., Clarke, R.T. Gunn, R. J. M., Kneebone, N. T. and Davy-Bowker, J. (2004). Impact of major changes in flow regime on the macroinvertebrate assemblages of four chalk stream sites, 1997-2001. River Research and Applications, 20: 775-794.

APPENDIX A

Natura 2000 Screening Protocol - Water Services Plans and Projects (National Parks and Wildlife Service)

Natura 2000 Screening Protocol - Water Services Plans and Projects

This screening methodology is designed to assist those planning and designing water services solutions when determining whether AA for Natura 2000 or European sites is necessary or not, but can also be used in the case of likely impacts on NHAs

Water Services infrastructure projects relate to the provision, operation and management of drinking water and wastewater services. These projects hold a high health and safety value for the public as well as being of benefit for biodiversity - it is therefore essential that such projects are screened at the earliest stage to avoid situations where nature conservation and human health and safety are pitched as competing interests.

This screening methodology will be reviewed regularly to ensure it remains consistent with the programmes of measures and River Basin Management Plans (RBMPs) currently being developed under the Water Framework Directive (WFD).

Water services infrastructure projects have the potential to impact upon nature conservation sites through the following broad mechanisms:

What projects must be screened?

For new projects and significant changes to any existing operations, if the answer is 'yes' to any of the following, the project (i.e. construction, operation and maintenance) must be screened for its impacts:

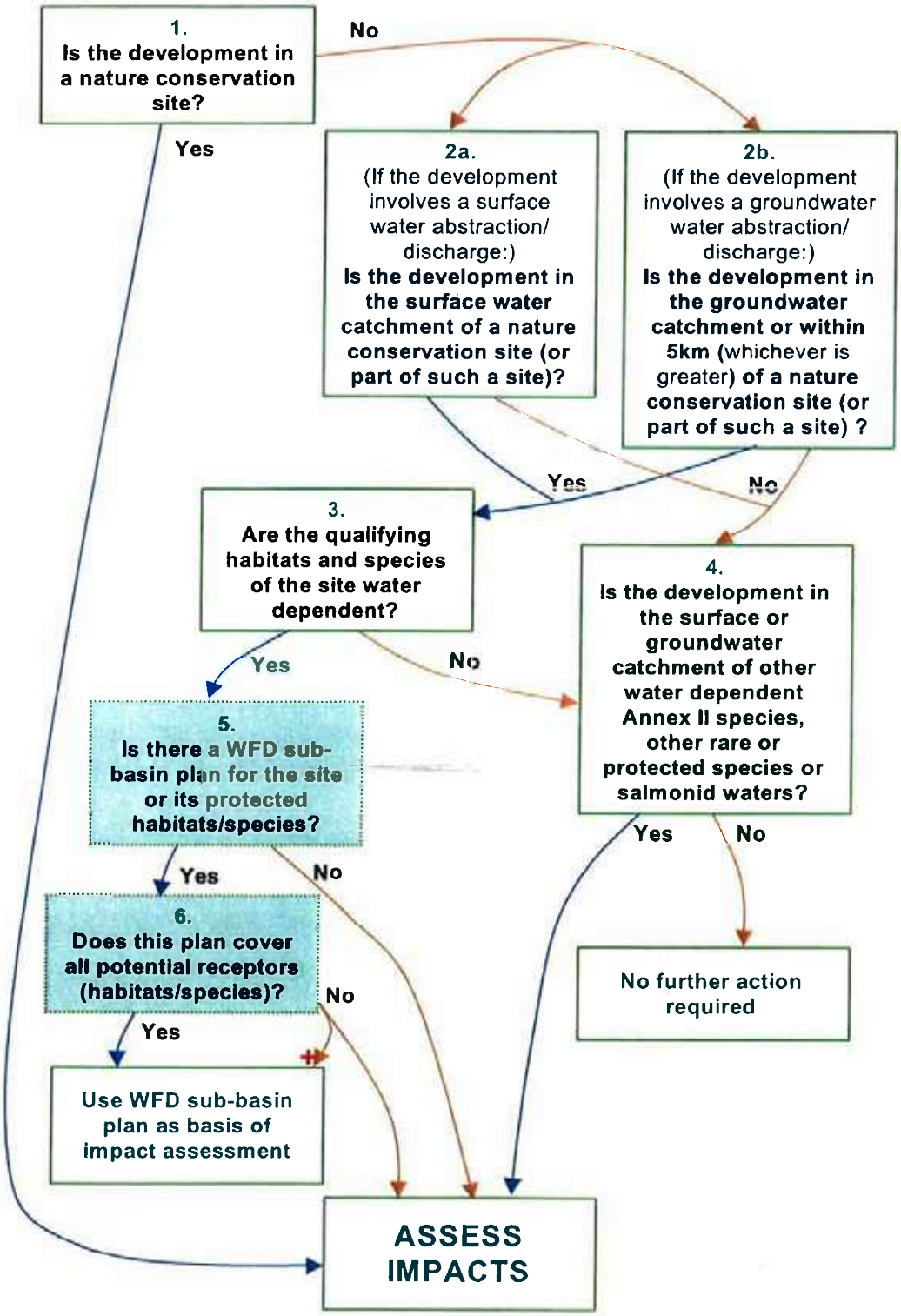
1. Is the development in or on the boundary of a nature conservation site?
2. Will nationally protected species be directly impacted ? Wildlife Act (1976 and 2000) and Flora Protection order (S.I. 94 of 1997)?
3. Is the development a surface water discharge or abstraction in the surface water catchment[1], or immediately down stream of a nature conservation site with water dependant qualifying habitats/ species[2]?
4. Is the development a groundwater discharge or abstraction in the ground water catchment[1] or within 5 km of a nature conservation site with water dependant qualifying habitats/species[2]?
5. Is the development in the surface water or groundwater catchment of salmonid waters?
6. Is the treatment plant in an active or former floodplain or flood zone of a river, lake, etc?
7. Is the development a surface discharge or abstraction to or from marine waters* and within 3km of a marine nature conservation site?
8. Will the project in combination with other projects (existing and Proposed) or changes to such projects affect the hydrology or water levels of sites of nature conservation interest or the habitats of protected species?

Note [1]. If there is a WFD sub basin plan for the sites or its protected habitats and the plan covers all potential receptors, i.e. habitats and species, this plan can be used as the basis for screening and impact assessment.

Note [2]. Estuaries are considered part of a catchment.

Below is a flow diagram for screening water services infrastructure projects, followed by explanatory notes on the diagram and other points of information. Screening is required to identify projects that must be assessed for potential impacts on nature conservation sites.

NB **<u>Catchments</u> of habitats and species of conservation value are addressed here as it is only through examining catchment-wide pressures that hydrological, water pollution and cumulative impacts can be properly assessed.**



Notes on flow diagram (Numbers correspond to question numbers in the Figure 1):

1. This question relates to direct impacts only and, therefore, all habitats and species of nature conservation value must be considered. If the development is within a Natura 2000 site, there is potential for direct loss of habitats and/or species of conservation value within the footprint of the development. The footprint includes all temporary and permanent access roads, trenching etc. The standard guidelines for the referral of all development applications that are adjacent to SACs to NPWS (i.e. within 500m), should also be followed here.

2. This and subsequent questions relate to indirect impacts, which are transmitted through water and, therefore, only have the potential to impact upon water dependent species. All projects in the catchments of conservation sites (i.e. both within and upstream of the site) have the potential to impact on the site and to contribute to the cumulative impacts on the site. The 5km stipulation is placed in Question 2b as it was used in the groundwater risk assessments for groundwater dependent conservation sites. Groundwater catchments are the zones of a groundwater body that contribute water to a receptor such as a conservation site. These catchments can be altered, however, through very large abstractions in certain aquifer types. Because these groundwater divides can change, the extra protection of 5km was included.

3. Habitats Directive Annex I habitats and Annex II species have been divided into water dependent (see tables 1 and 2 below) and non-water dependent for the purposes of the WFD. The list of water dependent birds will be finalised shortly. Within most conservation sites, particularly the large SAC-complexes, some areas will contain water dependent habitats/species and others will not. This means that the SAC boundary cannot be taken as indicative of the location of the relevant habitat or species. As a result, the LA will require the specific locations of the habitats and species in order to screen these projects. These data will need to be collected through surveys where the information is not available from NPWS or other sources. NPWS do not generally have the locations of habitats and species on a single GIS, or other readily available formats. Useful information will be available through NPWS monitoring programmes and databases, such as the rare flora database, as well as through NPWS management plans. NPWS has a public mapviewer tool in place at **http://www.npws.ie/en/MapsData** and is planning the development of a GIS that will be accessible to LAs.

4. The data for Annex II species in the wider countryside and other protected/rare species (outside designated sites) is less complete and requires further field surveys and data collection. Furthermore, as these species could extend even further downstream than the nature conservation sites, the downstream area that would need to be assessed for potential impacts could be significantly extended by this question.

5. No WFD sub-basin plans have yet been developed, however, Ireland has made a commitment to the Commission to draft 27 *Margaritifera* sub-basin plans before the end of 2008 (see table 3). Further such catchment plans will be developed for other species and habitats in SACs. These will set specific nature conservation and water quality/quantity targets for the sites and will prescribe the management measures than need to be undertaken within their catchments.

6. These sub-basin plans are likely to be species/habitat specific so that, even when such plans exist, all potential receptors may not be assessed and further assessments may be required for water services projects. Where sub-basin plans exist, it is likely that these can be used in combination with further impact assessments.

It should be noted that this screening mechanism is **unlikely to eliminate** many water services projects from assessment. This is particularly the case because of the occurrence of Annex II species (EU Habitats Directive 1992) in the wider countryside, other rare/protected species (Wildlife Acts) and salmonid waters.

Table 1 **Irish water dependent HD Annex I habitats.** Here "Surface Water" refers to ongoing direct inputs from rivers and lakes, but not to rainwater inputs or historical/formative inputs. The potential impacts of water services infrastructure projects are listed as low, medium or high under "Direct Impacts", "Hydrological Impacts" and "Water Pollution". These ratings are based upon the likelihood of impacts should a water services project be developed and do not consider the likelihood of such a project occurring in these catchments. (Note: these potential impacts require further checking by relevant NPWS experts).

HD Habitat Code	Habitat Name	Surface Water Dependent	Groundwater Dependent	Marine Water Dependent	Direct Impacts	Hydrological Impacts[1]	Water Pollution[2]
1110	Sandbanks which are slightly covered by sea water all the time			Yes	Low	Low	Medium?
1130	Estuaries	Yes		Yes	Low	Medium	Medium?
1140	Mudflats and sandflats not covered by seawater at low tide			Yes	Low	Medium	Medium?
1150	Coastal lagoons	Yes	Yes	Yes	Low	High	High
1160	Large shallow inlets and bays	Yes		Yes	Low	Low	Medium?
1170	Reefs			Yes			
1210	Annual vegetation of drift lines			Yes	Low	Low	Low
1220	Perennial vegetation of stony banks			Yes	Low	Low	Low
1230	Vegetated sea cliffs of the Atlantic and Baltic coasts						
1310	*Salicornia* and other annuals colonizing mud and sand			Yes	Low	Medium	Medium?
1320	*Spartina* swards (Spartinion maritimae)			Yes	Low	Medium	Medium?
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)		Yes	Yes	Medium	Medium	Medium?
1410	Mediterranean salt meadows (Juncetalia maritimi)		Yes	Yes	Medium	Medium	Medium?
1420	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)			Yes	Medium	Medium	Medium?
2110	Embryonic shifting dunes				Low	High	
2120	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)				Low	High	
2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)				Medium	Low	
2140	Decalcified fixed dunes with *Empetrum nigrum*				Medium	Low	
2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)				Medium	Low	
2170	Dunes with *Salix repens ssp. Argentea* (Salix arenariae)		Yes		Medium	Medium	Medium
2190	Humid dune slacks		Yes	Yes	High	High	High

[1] For coastal habitat, hydrological impacts will mainly result from hard structures changing flow patterns and, therefore, altering sediment deposition/erosion patterns.
[2] Discharges to groundwater may not be common, but we are taking into account those situations where they occur.

Table 2 **Irish water dependent HD Annex II species.** Here "Surface Water" refers to ongoing direct inputs from rivers and lakes, but not rainwater inputs or historical/formative inputs. The potential impacts of water services infrastructure projects are listed as low, medium or high under "Direct Impacts", "Hydrological Impacts" and "Water Pollution". These ratings are based upon the likelihood of impacts should a water services project be developed and do not consider the likelihood of such a project occurring in these catchments. (Note: these potential impacts require further checking by relevant NPWS experts).

HD Species Code	Species name	Common name	Surface Water Dependent	Groundwater Dependent	Marine Water Dependent	Direct Impacts	Hydrological Impacts	Water Pollution[3]
1013	*Vertigo geyeri*	Whorl snail		Yes		High	High	Medium
1014	*Vertigo angustior*	Whorl snail		Yes		High	High	Medium
1016	*Vertigo moulinsiana*	Whorl snail	Yes	Yes		High	High	Medium
1024	*Geomalacus maculosus*	Kerry slug				High		
1029	*Margaritifera margaritifera*	Freshwater pearl mussel	Yes			High	High	Very High
1065	*Euphydryas aurinia*	Marsh fritillary				High		
1092	*Austropotamobius pallipes*	White-clawed crayfish	Yes	Yes		Low to Medium	Medium to High	Medium
1095	*Petromyzon marinus*	Sea lamprey	Yes		Yes	Low to Medium	High	Medium?
1096	*Lampetra planeri*	Brook lamprey	Yes			Low to Medium	High	Medium?
1099	*Lampetra fluviatilis*	River lamprey	Yes			Low to Medium	High	Medium?
1102	*Alosa alosa*	Allis shad	Yes		Yes	Low to Medium	High	Medium?
1103	*Alosa fallax*	Twaite shad	Yes		Yes	Low to Medium	High	Medium?
1106	*Salmo salar*	Atlantic salmon	Yes		Yes	Low to Medium	High	High
1349	*Tursiops truncatus*	Bottle-nosed dolphin			Yes			
1351	*Phocoena phocoena*	Harbour porpoise			Yes			
1355	*Lutra lutra*	Otter	Yes		Yes	Low to Medium	Medium	Medium
1364	*Halichoerus grypus*	Grey seal			Yes			
1365	*Phoca vitulina*	Common seal			Yes			
1393	*Drepanocladus vernicosus*	Shining sickle moss		Yes		High	High	High
1395	*Petalophyllum ralfsii*	Petalwort		Yes		High	High	High
1421	*Trichomanes speciosum*	Killarney fern	Yes			High	High	Medium
1528	*Saxifraga hirculus*	Yellow marsh saxifrage		Yes		High	High	Medium
1833	*Najas flexilis*	Slender naiad	Yes			Low	High	High
1990	*Margaritifera durrovensis*	Nore pearl mussel	Yes			High	High	Very High

[3] Discharges to groundwater may not be common, but we are taking into account those situations where they occur.

HD Habitat Code	Habitat Name	Surface Water Dependent	Groundwater Dependent	Marine Water Dependent	Direct Impacts	Hydrological Impacts[1]	Water Pollution[2]
21A0	Machairs (* in Ireland)	Yes	Yes		High	High	High
3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)	Yes	Yes		Low	High	High
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea	Yes	Yes		Low	High	High
3140	Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.	Yes	Yes		Low	High	High
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation	Yes	Yes		Low	High	High
3160	Natural dystrophic lakes and ponds	Yes	Yes		Low	High	High
3180	Turloughs	Yes	Yes		Medium	Medium	High
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	Yes	Yes		Low to Medium	High	High
3270	Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation	Yes	Yes		Low	Medium	Low
4010	Northern Atlantic wet heaths with *Erica tetralix* (FLUSHES ONLY)		Yes		High	High	High
6410	*Molinia* meadows on calcareous, peaty or clavey-silt-laden soils (Molinion caeruleae)	?	Yes		Medium	?	?
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	Yes	Yes		Medium	Low	Low
7110	Active raised bogs (LAGG ONLY)	Yes	Yes		High	High	High
7120	Degraded raised bogs still capable of natural regeneration (LAGG ONLY)	Yes	Yes		High	High	High
7130	Blanket bog (*active only) (FLUSHES ONLY)		Yes		High	High	High
7140	Transition mires and quaking bogs	Yes	Yes		High	High	High
7150	Depressions on peat substrates of the Rhynchosporion	Yes	Yes		High	Low	
7210	Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae		Yes		High	High	High
7220	Petrifying springs with tufa formation (Cratoneurion)		Yes		High	High	High
7230	Alkaline fens		Yes		High	High	High
8310	Caves not open to the public		Yes			Low	Low
8330	Submerged or partly submerged sea caves			Yes			
91D0	Bog woodland		Yes		High	High	Low
91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)	Yes	Yes		Medium	High	Medium

Tionscadal Soláthair Uisce
Water Supply Project

Natura Impact Statement (NIS)

(Appendix D) DAU Consultation

Document no: 32105801/EIAR/NIS/Appendix D
Version: Final

December 2025

Uisce Éireann
Irish Water

Jacobs

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An Roinn Ealaíon, Oidhreachta,
Gnóthaí Réigiúnacha, Tuaithe agus Gaeltachta

Department of Arts, Heritage,
Regional, Rural and Gaeltacht Affairs

Your Ref:
Our Ref: **G Pre00163/2016**
(Please quote in all related correspondence)

22 February 2017

Jacobs
Merrion House
Merrion Road
Dublin 4

Via email

Re: Water Supply Project Eastern and Midlands Region

A chara

On behalf of the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, I refer to correspondence received in connection with the above.

Outlined below are heritage-related observations/recommendations of the Department under the stated heading(s).

Nature Conservation

The Department refers to Irish Water's correspondence of 08/11/16 in respect of the proposed new water supply project for the Eastern and Midlands Region, and to the 'Environmental Impact Statement – Scoping Report' (November 2016), prepared by Jacobs – Tobin.

This submission is made at pre-application stage in the context of this Department's role in relation to nature conservation. The observations are intended to assist you in meeting the obligations that arise in relation to European sites, other nature conservation sites, and biodiversity and environmental protection in general in the context of the current proposal and any future application for planning consent. They cover the assessments that may be required, available data and information sources, and key issues of potential relevance to a project of this type and scale in the areas in question. The observations are not exhaustive and are made without prejudice to any future recommendation that may be made by the Minister and this Department in the future.

This submission has focused on the 'Environmental Impact Statement – Scoping Report', hereafter the 'scoping report'. It is noted that a 'Final Options Appraisal Report' has also been supplied but is not considered here. The Department does not have a role in identifying the need for the project, or in selecting the preferred option but advises that all relevant supporting data and documentation are presented with the application to show that the preferred option has been selected on a robust scientific basis and can pass the relevant tests of the planning and environmental assessment processes.

Previous advice and submissions

The Department attended a briefing meeting with Irish Water and its consultants on 25/08/16, and raised and/or discussed many of the points that are outlined below. The Department engaged previously with the related 'Greater Dublin Water Supply Programme' over many years, and made submissions in relation to that plan and its associated SEA and appropriate assessment. It is expected that previous advice given by this Department will be taken into account where this remains valid and, accordingly, not all points raised in the past are reiterated here.

Project outline and setting

The overall project is described in general terms in the scoping report, but not all details are currently available. The full extent of the development, including associated and ancillary works, and the potential effects that may arise, are difficult to gauge on the basis of the information provided so a precautionary approach has been taken below.

The overall project entails water abstraction from a new source in the Parteen Basin, treatment in a nearby facility, and pumping to the termination point reservoir in Peamount, south Co. Dublin. It is also stated that the source will supply domestic, commercial and industrial communities along the 170km pipeline route.

The project footprint will have a permanent area of approximately 26.5ha in at least four locations, and a temporary area of disturbance of about 850ha (50m working width over 170km). The abstraction source is Parteen Basin, on the Shannon system, and the abstraction rate of 330,000m^3 per day is noted.

Environmental assessments required

It is understood that an EIS and Natura Impact Statement (NIS) are in preparation and/or will be required in connection with the future application(s) for consent; aspects of the scope of the EIS and NIS are covered in this submission. The proposal will be the subject of a planning application (strategic infrastructure provisions) in the future; An Bord Pleanála will be the competent authority for EIA and appropriate assessment. The proposal may require other consents (e.g. abstraction order, or revisions of IPPC licences). The Board will provide advice at pre-application stage in relation to the environmental assessments required; a written opinion on the information to be contained in an EIS may also be requested from the Board.

It is presumed that Irish Water has identified that the project is likely to have a significant effect on a European site. Screening for appropriate assessment is a formal statutory process undertaken by the competent authority when an application for permission for a proposed development is made under specific legislation. Contrary to what is said in the scoping report (Section 9.5 – Appropriate assessment), screening for appropriate assessment does not necessitate the preparation or submission of a screening report. It is advised that a clear distinction is made between the formal process of screening for appropriate assessment, and references to screening in the NIS, as in the 'screening in of sites' or 'screening in of projects (elements)'. The latter are used in the scoping report, and in practice, but do not have the same meaning as screening for appropriate assessment.

The Department has noted certain references to aspects of the appropriate assessment process which are inconsistent with the relevant legislation, and/or misrepresent the role of an applicant, as opposed to the competent authority. All such inaccuracies and inconsistencies should be addressed and rectified in the NIS, and the applicable legislation should be followed, including in terms of the terminology that is used, i.e. Part XAB of the Planning and Development Act 2000, as amended (e.g. European sites and Natura 2000 network, but not Natura 2000 sites).

Available guidance

Existing EU and Irish guidance on EIA and appropriate assessment should be followed in general terms when carrying out the assessments required. However, Irish Water should also be cognisant of changes in the interpretation and application of directives and national legislation arising from jurisprudence of the European and Irish courts, particularly in respect of Article 6 of the Habitats Directive. There should also be due regard to the stages and tests of the assessment processes as set out in legislation, and of the terminology that applies, notably, for example, in Part XAB of the Planning and Development Act, 2000, as amended, in the case of appropriate assessment. Where legislation updates or amends elements of existing guidance, the former should be used or applied in preference in all cases.

Project components

The assessments should be based on full and detailed descriptions of all parts of the project, and all development, including associated and ancillary works and services, and all lands required, at all stages of the project, from ground testing and site preparation to reinstatement and decommissioning. All relevant project details and works areas should be shown in maps and drawings, and should form part of any application for consent, including underground elements and surrounding works areas; any areas where development will occur should be included within the application area. In addition to the main project footprint, this should include, for example, site access and roads; works areas; site compounds; temporary and permanent facilities and storage areas; pipe-laying; removal and replacement of field boundaries and other structures; micro-tunnelling; relocation or diversion of services; site investigations; fencing; disposal of surplus materials and other wastes; reseeding, replanting and landscaping, etc.

Full details of mitigation measures should be provided and shown in maps and drawings, as appropriate. The likely effects of ecological and other mitigation measures should also be assessed, e.g. archaeological testing or the installation and subsequent removal of silt control measures. Mitigation measures should be demonstrated to be effective in addressing and ameliorating the full scale and nature of the effects arising, at all relevant project stages, and should be demonstrated to be feasible within the specific characteristics and constraints of the proposed site. For example, whether silt control measures, if necessary, will work in low and high water conditions, both during and after the works are carried out, should be considered and risks and likely effects assessed accordingly. Effective systems, including ecological supervision and/or an ecological clerk of works, will need to be in place to ensure proper and timely implementation of all ecological and environmental protection measures.

It is understood that a schedule of environmental commitments is to be included in EIS. When this is prepared, it should dovetail with mitigation measures in the NIS, and ensure that the mitigation measures for each environmental topic, and the works methods and sequencing, take account of each other across the various chapters.

It is unclear whether the need for construction (and environmental) management plans and method statements will arise. If needed, these should be included to the extent possible as part of any application for consent, and assessed and mitigated as necessary. If indeterminable at the pre-consent stage, the full range of options and methods that may be used, and all the potential impacts of development and works that could arise should be assessed and covered in the application for consent. Systems should also be set out to show how decisions on options or methods will be made, and by whom, and how it will be decided what ecological mitigation measures will apply, on a day-to-day and overall project basis.

Environmental baseline/receiving environment

Determining the extent of the receiving environment, 'study area' or 'zone of influence' for surveys, assessment and analysis will require particular attention for a project of this nature and scale. In addition to direct and indirect effects, cumulative and in combination effects should inform such considerations and associated analysis from the outset. The receiving environment will extend outside the footprint and environs of the physical infrastructure and temporary works areas of the project to include significant parts of the Shannon system, as this is the abstraction source.

The hydrodynamic and water quality model, which is under construction (Section 11.1), will be needed to inform the EIS and NIS, and the identification of the 'zone of influence'. This model should be included or referenced within the NIS, and used to inform the assessment and analysis of the implications of the project for the conservation objectives and integrity of relevant European sites.

Careful consideration should be given to what forms part of the EIS and NIS and how the two documents will work in tandem with each other to present all necessary information and analysis to support the environmental assessments which must be carried out. Effective and consistent cross-referencing between the EIS, NIS and appendices should be used for clarity and completeness, and to avoid the need for excessive duplication.

Cumulative / in combination effects

In relation to the assessment and analysis of potential cumulative or in combination effects of other plans and projects, there should be due consideration of the following and of any relevant plan-level mitigation that the plans contain:

- OPW Flood Risk Management Plans/CFRAMS
- Flood alleviation measures on the lower Shannon system, and the OPW annual and multi-annual drainage maintenance programmes
- County/City Development Plans
- Local Area Plans
- Irish Water plans and projects
- Ireland's River Basin Management Plan (2nd cycle now commencing)
- Bord na Móna operations and IPPC licence conditions, including Condition 10: Cutaway bog rehabilitation plan and associated reporting and validation
- Other developments, including agricultural reclamation and restructuring of land holdings

Available information

You are advised to consult the National Parks and Wildlife Service website (www.npws.ie) as a key source of data, information and publications on nature conservation sites and biodiversity issues of potential relevance to the area and to the environmental assessment(s). This includes site boundaries, site synopses, lists of qualifying interests (SACs) and special conservation interests (SPAs), conservation objectives (European sites), features of interest (NHAs), and dates of site designation. GIS datasets are available for download for nature conservation sites[1], and for certain habitats and species arising from various sources, including national surveys[2]. Other NPWS-held data on habitats and species may be requested by submitting a 'Data Request Form'[3]. Site synopses for non-statutory proposed NHAs, or pNHAs, can be made available on request.

[1] Special Areas of Conservation (SACs, currently known as candidate sites but fully legally protected); Special Protection Areas (SPAs); Natural Heritage Areas (NHAs); and proposed Natural Heritage Areas (pNHAs)
[2] http://www.npws.ie/maps-and-data/habitat-and-species-data
[3] Available from https://www.npws.ie/maps-and-data/open-data-policy

Site-specific conservation objectives (SSCOs), and associated backing documents, are available for some European sites on the NPWS website[4], including for Lower River Shannon cSAC. GIS datasets associated with these conservation objectives are also available for download: https://www.npws.ie/maps-and-data/habitat-and-species-data. For all other European sites, generic conservation objectives are available and the most up-to-date versions should be used and referenced in any relevant documents.

The Habitats Directive Article 17 reports for 2007 and 2013, which should also be consulted, are available from http://www.npws.ie/article-17-reports-0, as is the recent national report on Article 12 of the Birds Directive, at http://www.npws.ie/news/birds-directive-article-12-reporting. The national habitat surveys that have been undertaken, and their resulting reports, should be consulted, including for information regarding the definitions and evaluations that have been developed for Annex I habitat types in Ireland.

In addition to the above, data on ecological features and environmental factors in or near the project area will be available from various other sources including, for example:

- Other organisations, e.g. National Biodiversity Data Centre, BirdWatch Ireland, Bat Conservation Ireland, etc.;
- EISs, NISs and other reports for projects in the general area;
- NISs, NIRs and SEA Environmental Reports for plans covering the general area, including as listed above.

Surveys and assessments required

Some general notes on the content and preparation of an NIS are included in Appendix 1 and should be taken into account. In addition, Appendix 2 includes a basic listing of key ecological receptors requiring consideration in any ecological impact assessment, including the 'flora and fauna' chapter of an EIS. Some specific points of relevance to the current proposal and its assessment(s) follow.

Conservation objectives – European sites: assessment and analysis of likely significant effects on European sites should be carried out with respect to the conservation objectives of the site(s), taking account of existing conservation status/condition, and the cumulative or in combination effects of other plans and projects in all cases. The most recent version of the conservation objectives should be used and referenced[5] in relevant documentation. It should also be noted that, in the case of generic conservation objectives, the objectives are to maintain or restore the favourable conservation condition of the listed qualifying interests (SACs) or special conservation interests (SPAs) at the site in question, so the assessment and analysis should cover both scenarios. In the case of site specific conservation objectives, parameters are set for individual qualifying interests and special conservation interests (i.e. attributes and targets) and these should be used in the assessments and analyses that are undertaken; these objectives specify whether the conservation condition of the habitat or species is to be maintained or restored at the site. Account should be taken of the 'notes/guidelines' on page 3 of these objectives. Each of the individual conservation objectives of relevance should be addressed separately in the analysis undertaken. Conservation objective supporting documents should be consulted.

Hydrology: the hydrodynamic and water quality model, which is in development, will be essential in identifying the zone of influence of the project, the types of ecological surveys required, and the areas over which they should occur to produce the NIS. The model will be necessary to inform the assessment and analysis in the NIS and to support the conclusions reached. In addition to cross-referencing the model and the 'water' chapter of the EIS (and appendices, if relevant) in the NIS, the findings and predictions in relation to hydrological, hydraulic and water quality impacts will need

[4] https://www.npws.ie/protected-sites/conservation-management-planning/conservation-objectives

[5] Conservation objectives should be referenced in all cases with the version number and date

to be fully integrated with the ecological assessment and analysis in the NIS, i.e. the hydrological expert(s) should be involved in preparing the NIS. While the lower Shannon is already an altered system, the conservation objectives of aquatic and water-dependent Annex I habitats and Annex II species in Lower River Shannon cSAC (site code 002165) should be noted. Among other things, consideration should be given to whether there is potential for reduced flows over longer periods, or reduced flushing in the channel downstream of Parteen Basin, to occur and impact sedimentation rates and allow encroachment by trees, alluvial woodland and other wetland habitats to occur. The impacts on any tributaries of the Shannon system should also be assessed in the NIS.

Ecological surveys: ecological surveys, including habitat and species surveys, should be carried out by suitably qualified persons at the appropriate time(s) of the year, depending on the species being surveyed for. The EIS and NIS should include full details of the surveys carried out, the methodologies used, and their timing and the areas over which they occurred, as well as the results of the surveys. It is expected that best practice will be followed in any survey methodology used and, if necessary, non-Irish methodologies should be adapted for the Irish situation.

Habitat surveys should be carried out for the entire footprint and all works areas of the project. Any Annex I habitats should be identified as such, and the necessary supporting scientific information and analysis should be supplied to support their categorisation as Annex I habitats, or not (where similarities or possible correspondences exist). All permanent and temporary habitat losses and disturbances should be quantified and qualified, including the full extent of linear habitats that will be lost or damaged along the pipeline route – see below in relation to ecological corridors. Where habitats are to be reinstated, rehabilitated and replaced, full details of the existing habitat areas will be required. The EIS should include details of restoration and rehabilitation, including sources of plants, substrata or other materials, and details of monitoring required.

Otter surveys will be required as part of the EIS and/or NIS. It should be noted that Otters, which are strictly protected Annex IV (also Annex II species), are found along practically every watercourse. A suitably qualified person should carry out the otter survey and it should be noted that a one day walkover survey would not be adequate to determine the presence of Otters, or the details of the mitigation measures for the species, including avoidance, which may be required.

Bat surveys carried out over all relevant seasons will be required as part of the EIS and/or NIS. The advice and input of a bat specialist should be sought at an early stage to review available data on bats, and to identify target species, survey areas, and the survey methodologies to be used.

Bird surveys carried out over all relevant seasons will be required as part of the EIS and/or NIS. The advice and input of an ornithologist should be sought at an early stage to review available data on birds, and to identify target species, survey areas, and the survey methodologies to be used. The approach should bear in mind the tests of the environmental assessments required and the questions to be answered. The cumulative or in combination effects of other plans and projects on birds and their habitats must also be assessed.

Ecological corridors and stepping stones: when assessing impacts on habitats as detailed in section 9.3.1, impacts on habitats that act as corridors or stepping stones as envisaged by Article 10 of the Habitats Directive should be included. Hedgerows may be used by bat species as navigation routes to travel between roosting and feeding areas. Any losses of such hedgerows need to be mitigated by new planting in advance of removal.

Derogation licences

Where there are any impacts on protected species, or their resting or breeding places, such as badgers and their setts, bats and their roosts, otters and their holts, protected flora and their habitats and birds and their nests then licences under the Wildlife Acts 1976 to 2012 and/or

derogations under the European Communities (Birds and Natural Habitats) Regulations 2011 to 2015 may be required.

Invasive species

The extensive excavation, construction and ground disturbance works that will be required by this project mean that there is a high risk of encountering invasive plant species and causing their spread or dispersal, thereby contravening Regulation 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011. Invasive species should be surveyed to establish the current baseline and to develop a strategy and mitigation measures for their treatment, control, and monitoring before, during and after construction.

Impacts as a result of changes in the hydrological management of the Shannon

A critical ecological concern is the potential impact of the proposed water abstraction during drought periods, and how water levels will be managed in such circumstances. This relates to impacts both downstream and upstream of Parteen Weir. The FOAR[6] states that a flow rate of $10m^3/s$ will be guaranteed by statute, by the ESB reducing water flow through the Ardnacrusha headrace. There are three questions, amongst others, which the EIS and NIS will need to answer:

(a) What are the worst-case impacts, for the habitats and species of conservation importance in the 'Old River Shannon' part of the Lower River Shannon cSAC (2165), of water levels falling below $10m^3/s$ during a severe drought?
(b) In the event of a severe drought, how can it be guaranteed that an abstraction rate of >350Ml/day will not be exceeded due to water shortages in the Midlands and Eastern Region?
(c) How will the ESB guarantee the $10m^3/s$ flow at Parteen Weir during a severe drought? Will this involve lowering lake levels in Lough Derg much more than normal, or, alternatively, lowering lake levels in Lough Ree much more than normal?

With regard to question (c), it is presumed that levels in Lough Derg, being maintained by Parteen Weir, will be less affected in order to deliver the minimum flow of $10m^3/s$, but that levels in Lough Ree may be drawn down more to ensure levels in Lough Derg and Parteen Weir are maintained. As this is a scenario which was not discussed at previous pre-planning meetings between Irish Water and the NPWS of this Department, your attention is particularly drawn to the need for a complete understanding of how water management in the Shannon may affect water-dependant habitats in Lough Ree cSAC (Site Code 000440) in particular. These include the habitat types, natural eutrophic lakes (3150) and alkaline fens (7230).
Conservation Objectives for this site are available at
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000440.pdf (see, especially, water level fluctuations, pp. 9 & 16).

Impacts of infrastructural components of the development

There are a number of specific potential impacts which require assessment in relation to the specific components of infrastructure being proposed in Co. Tipperary. These are not exhaustive and are additional to issues raised above, but nonetheless, your attention is drawn to them. These are:

- Intake structure: An Impingement Mortality and Entrainment Characterization Study is recommended. Sufficient survey data should be available to predict population effects, if any. The design of the intake structure would preferably follow best available technology in avoiding adverse effects of impingement or entrainment.
- Intake structure: the effects of any pipe or surface cleaning fluids, if necessary for control of fouling, should be assessed.

[6] Final Options Appraisal Report

- Intake structure: effects of noise on wildlife requires assessment.
- Water treatment plant: the effects of disposal of waste (alum, etc.) requires assessment; options for where the waste will be disposed of need to be identified.
- In addition to surveys referred to above, a survey of wintering hen harrier should be carried out in the areas affected by the water treatment plant and intake piping infrastructure.
- As best EIS practice, surveys for biodiversity component groups such as molluscs, Lepidoptera, bryophytes, lichens and fungi should be undertaken at the water treatment plant and water treatment intake works proposed sites, at appropriate times of the year.
- As probably recommended by Inland Fisheries Ireland, a thorough survey for fish, and in particular eels, should be undertaken in Parteen Basin. Eels are of particular importance in the diet of otters, to which one of the conservation objectives of the Lower River Shannon cSAC relates, as well as being endangered species in their own right.
- At the water balancing site in North Tipperary, as part of standard botanical and zoological surveys, surveys should include lizard, badger and stoat.

The above observations/recommendations are based on the papers submitted to this Department on a pre-planning basis and are made without prejudice to any observations that the Minister may make in the context of any consultation arising on foot of any development application referred to the Minister, by the planning authority/ies, in her/his role as statutory consultee under the Planning and Development Act, 2000, as amended.

You are requested to send further communications to this Department's Development Applications Unit (DAU) at **manager.dau@ahg.gov.ie** (team monitored); if this is not possible, correspondence may alternatively be sent to:

The Manager
Development Applications Unit (DAU)
Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs
Newtown Road
Wexford
Y35 AP90

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Joanne Lyons,
Development Applications Unit
Tel: (053) 911 7447

Appendix 1
Notes on the preparation and content of an NIS

The term, NIS, is defined in legislation[7]. In general, an NIS, if required, should present the data, information and analysis necessary to reach a definitive determination as to 1) the implications of the plan or project, alone or in combination with other plans and projects, for a European site in view of its conservation objectives, and 2) whether there will be adverse effects on the integrity of a European site. The NIS should be underpinned by best scientific knowledge and objective information, as required in the case of screening for appropriate assessment, and by the precautionary principle.

The following advice is offered in relation to the preparation and content of an NIS:

1. An NIS is a scientific assessment that presents relevant evidence, data and analysis, and focuses on the implications of the plan or project, on its own and in combination with other plans and projects, for the conservation objectives of the relevant European site(s), taking the full scope of these objectives, whether generic or site specific, into account;
2. Examination of the potential effects of the plan or project must be undertaken to identify what European sites, and which of their qualifying interests (SAC), special conservation interests (SPA) or conservation objectives, are potentially at risk. In combination effects must also be taken into account. This is required to determine a 'zone of influence' or 'zone of impact' for the project, if such a concept is used. The 15km distance in existing guidance is an indicative figure only and its application and validity should be examined and justified in each specific case on an ecological or other basis;
3. The scientific basis on which sites and their conservation objectives are included or excluded from assessment and analysis should be presented and justified;
4. The full area or extent of the likely effects of the plan or project should be determined and quantified. Where temporary damage and disturbance will occur, predicted timelines for recovery should be presented;
5. The relevant environmental baseline and trends in European sites should be taken into account, bearing in mind changes and in combination effects which have occurred since site designation;
6. An NIS should be informed by any necessary surveys of habitats and species at the appropriate time(s) of year to identify, describe, evaluate and map their presence within the receiving environment. In all relevant cases, the scientific basis and justifications for categorising or not categorising habitats as Annex I habitats, or priority types, should be presented;
7. An NIS should be informed by any necessary hydrological, hydrogeological or geotechnical investigations to assess impacts on habitat structure and function;
8. Where mitigation measures are required, full details should be included in the project description and drawings, with method statements provided, where necessary. It must be demonstrated that mitigation measures will be delivered in full, and at the appropriate time, at all post-consent stages, and that they will be effective in any specific location or set of conditions. The necessary analysis should be presented to demonstrate how the mitigation measures will avoid or remove the risks of adverse effects on the integrity of European sites that have been identified in an NIS so that the final analysis is undertaken in the context of the predicted residual effects;
9. An NIS should contain, or clearly cross-reference, all the scientific data and analysis on which the assessment is based, and should contain clear and precise findings and conclusions as to the implications of the project, on its own and in combination with other plans and projects, for the conservation objectives and integrity of the relevant European site(s).

[7] As defined in Section 177T of the Planning and Development Act, 2000 as amended, an NIS means a statement, for the purposes of Article 6 of the Habitats Directive, of the implications of a proposed development, on its own and in combination with other plans and projects, for a European site in view of its conservation objectives. It is required to include a report of a scientific examination of evidence and data, carried out by competent persons to identify and classify any implications for the European site in view of its conservation objectives

Appendix 2
Key ecological receptors and surveys required

The following key ecological receptors should be included among the considerations in the flora and fauna section of an EIS, or in an ecological impact assessment:

- Sites with nature conservation designations, including proposed NHAs, including the reasons for their designation, and their conservation objectives, where available;
- Annex IV (Habitats Directive) species of fauna and flora, and their breeding sites and resting places, which are strictly protected under the European Communities (Birds and Natural Habitats) Regulations, 2011;
- Other species of fauna and flora which are protected under the Wildlife Acts, 1976-2000;
- '*Protected species and natural habitats*', as defined in the Environmental Liability Directive (2004/35/EC) and European Communities (Environmental Liability) Regulations, 2008, including:
    - Birds Directive – Annex I species and other regularly occurring migratory species, and their habitats (wherever they occur);
    - Habitats Directive – Annex I habitats, Annex II species and their habitats, and Annex IV species and their breeding sites and resting places (wherever they occur);
- Other natural and semi-natural habitats of ecological value in a national to local context;
- Stepping stones and ecological corridors covered by Article 10 of the Habitats Directive.

Available information on sites, habitats and species should be reviewed, including datasets available on request from NPWS and from www.npws.ie (see main text). In addition, the following are required to characterise the receiving environment and to assess the likely ecological effects:

- Habitat survey of the site and surrounds, following the Heritage Council methodology[8] (2011), and with particular focus on any Annex I or potential Annex I habitats present;
- Identification, description, evaluation and mapping of any Annex I habitats present, including in terms of the vegetation communities, flora and fauna present, as appropriate. Whether or not there is correspondence with Annex I habitats, or priority types, should be examined and justified on scientific grounds;
- A habitat map of the site and surrounds with the footprint of the entire project, all lands required, and all works areas and access routes overlain, to enable impacts on habitats to be quantified and qualified;
- Botanical surveys of the receiving environment to be undertaken at the appropriate time of year to properly characterise and evaluate the habitats present, and identify any rare or protected species, including bryophytes;
- Faunal surveys of the receiving environment to be undertaken at appropriate times of the year to identify any rare or protected species that use the site and surrounding areas, and to evaluate the importance of the site for fauna.

[8] *Best Practice Guidance for Habitat Survey and Mapping.* (2011). Heritage Council, Kilkenny

An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

Your Ref: **Water Supply Project Eastern and Midlands Region**
Our Ref: **G Pre00330/2023**
(Please quote in all related correspondence)

14th December 2023
Via email to watersupply@water.ie

Re: Water Supply Project Eastern and Midlands Region - Environmental Impact Assessment Report Scoping

A chara,

I refer to correspondence received in connection with the above. Outlined below are heritage-related observations/recommendations of the Department co-ordinated by the Development Applications Unit under the stated heading(s).

Archaeology

The Department of Housing, Local Government and Heritage has reviewed the 'EIA Scoping Methodology Report' for the proposed Water Supply Project Eastern and Midlands Region.

It is noted that an Archaeological Impact Assessment is scoped into the proposed EIA process; this must be carried out by a suitably qualified Consultant Archaeologist. The supplied methodology indicates that this will incorporate desk based research and that targeted geophysical survey has been carried out on a localised basis.

The Department advises that following are carried out as part of the Archaeological Impact Assessment:

- The planned desk-study must be supported by a field inspection regime and should inform (as appropriate):
    - Targeted non-intrusive advance geophysical survey or prospection (such as Ground Penetrating Radar Surveys)
    - Targeted advance archaeological test excavation
    - Targeted underwater archaeology surveys or wade surveys
    - Targeted built heritage surveys

It is essential that the baseline archaeological and cultural heritage environment is fully defined and well-characterised.

- Any and all intrusive advance investigations (such as, but not limited to, ground investigations for soils/geology/hydrogeology) carried out as part of the EIA or design process should be subject to a programme of archaeological monitoring by a suitably qualified archaeologist

The results of these investigations should form part of the EIA process and be incorporated within the EIA Report. The Department is happy to provide further advice and clarification as and if required in relation to the preparation of suitably comprehensive assessments as outlined above, with particular regard to the scope and locations for any advance non-intrusive prospection, advance test excavation, underwater archaeology surveys/wade surveys or built heritage surveys that would be appropriate to inform the assessment of this proposed scheme.

Notwithstanding the above, the Department awaits the submission of this assessment before commenting further.

Nature Conservation

This submission is made at pre-application stage in the context of this Department's role in relation to nature conservation. The observations are intended to assist you in meeting the obligations that arise in relation to European sites, other nature conservation sites, and biodiversity and environmental protection in general in the context of the current proposal and any future application for planning consent. The observations are not exhaustive and are made without prejudice to any future recommendation that may be made by the Minister and this Department in the future.

The abstraction source, the Parteen Basin, is within the Lower River Shannon SAC (site code 002165), and water abstraction will impact on the hydrology and hydraulics of the Lower Shannon system to some extent. Impacts need to be considered both upstream and downstream of the Parteen Basin.

A detailed hydrodynamic and water quality model will be necessary to inform the assessment and analysis in the NIS and to support the conclusions reached. The findings and predictions in relation to hydrological, hydraulic and water quality impacts will need to be fully integrated with the ecological assessment and analysis in the NIS, i.e. the hydrological expert(s) should be involved in preparing both the EIS and NIS. While the lower Shannon is already an altered system, the conservation objectives of aquatic and water-dependent Annex I habitats and Annex II species in Lower River Shannon SAC (site code 002165) should be noted. Consideration should be given to whether there is potential for reduced flows over longer periods, or reduced flushing in the channel downstream of Parteen Basin to occur, which may impact sedimentation rates and allow encroachment by trees, alluvial woodland and other wetland habitats to occur. The impacts on any tributaries of the Shannon system should also be assessed in the NIS.

The potential impact of the proposed water abstraction during drought periods, and how water levels will be managed in such circumstances is of concern. This relates to impacts both downstream and upstream of Parteen Weir. Some of these concerns have previously be raised by this Department. It is noted that a flow rate of 10m3/s will be

guaranteed (by statute) by the ESB reducing water flow through the Ardnacrusha headrace. There are five questions, amongst others, which the EIS and NIS will need to answer:

(a) Firstly, is the minimum flow rate of 10m3/s compatible with the Qualifying Interests of the Lower River Shannon SAC (2165) achieving favourable conservation status?

(b) What are the worst-case impacts, for the habitats and species of conservation importance in the 'Old River Shannon' part of the Lower River Shannon SAC (2165), of water levels falling below 10m3/s during a severe drought?

(c) In the event of a severe drought, how can it be guaranteed that an abstraction rate of >350Ml/day will not be exceeded due to water shortages in the Midlands and Eastern Region?

(d) How will the ESB guarantee the 10m3/s flow at Parteen Weir during a severe drought? Will this involve lowering lake levels in Lough Derg much more than normal?

(e) Parteen Weir likely acts as a large sediment trap. Will there be a need/requirement to clean this for the proposed abstraction?

Otter surveys will be required as part of the EIS and/or NIS. It should be noted that Otters, which are strictly protected Annex IV (also Annex II species), are found along almost every watercourse. A suitably qualified person should carry out the otter survey to determine the presence of Otters and any subsequent details of mitigation measures for the species, including avoidance, which may be required.
A thorough survey for fish, and in particular eels, should be undertaken in Parteen Basin. Eels are of particular importance in the diet of Otters, to which one of the conservation objectives of the Lower River Shannon SAC relates, as well as being endangered species in their own right. The Department recommends consultation with the IFI regarding a fish (and fish pass).

There is also a likelihood of cumulative or in combination effects arising notably from flood relief and drainage activities on the lower Shannon system. In relation to the assessment and analysis of potential cumulative or in combination effects of other plans and projects, there should be due consideration of the following and of any relevant plan-level mitigation that the plans contain:

- OPW Flood Risk Management Plans/CFRAMS

- Flood alleviation measures on the lower Shannon system, and the OPW annual and multi- annual drainage maintenance programmes
- County/City Development Plans
- Local Area Plans
- Irish Water plans and projects
- Ireland's River Basin Management Plan
- Other developments, including agricultural reclamation and restructuring of land holdings.

The above observations/recommendations are based on the papers submitted to this Department on a pre-planning basis and are made without prejudice to any observations that the Minister may make in the context of any consultation arising on foot of any development application referred to the Minister, by the planning authority/ies, in her/his role as statutory consultee under the Planning and Development Act, 2000, as amended.

You are requested to send any further communications to this Department's Development Applications Unit (DAU) at manager.dau@npws.gov.ie, or to the following address:

The Manager
Development Applications Unit (DAU)
Government Offices
Newtown Road
Wexford
Y35 AP90

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Cormac O'Flaherty

Cormac O'Flaherty
Development Applications Unit
Administration
Tel: 01-237 6003

An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

Your Ref: **Pre-Consultation Briefing on the Water Supply Project, Eastern and Midlands Region**
Our Ref: **G Pre00330/2023**
(Please quote in all related correspondence)

31st January 2025
Via email to watersupply@water.ie

Re: Pre-Consultation Briefing on the Water Supply Project, Eastern and Midlands Region

A chara,

I refer to correspondence received in connection with the above. Outlined below are heritage related observations/recommendations of the Department co-ordinated by the Development Applications Unit under the stated heading(s).

Nature Conservation

Further to the online pre-planning consultation meeting with this Department on 22 November 2024, and your e-mail request of 20 December 2024 for outstanding questions from the National Parks & Wildlife Service which were unable to be discussed at the meeting due to time restrictions, please see below the relevant questions. Please note that these questions are in the context of previous correspondence on this case (letter of 14 December 2023, etc.).

(1) To avoid adverse water level impacts in the Lower River Shannon SAC, where water discharge could fall below 10 m^3/sec at Parteen Weir during a severe drought, at what date would the ESB slow or cease the discharge through Ardnacrusha Dam?
(2) Can the extended period of reduced flow (above 10 m^3/sec at Parteen Weir) during drought periods, be modelled?
(3) Please update on the current status of the proposed fish-pass at Parteen, and any data available on the use of Parteen Basin by lamprey species.
(4) Is there data available to show that the design of the intake screens delivers at flow rate of 0.15 m^3/sec?
(5) Will there be a requirement for screen cleaning and intake pipe anti-fouling?

Aonad na nIarratas ar Fhorbairt, Oifigí an Rialtais, Bóthair an Bhaile Nua, Loch Garman, Y35 AP90
Development Applications Unit, Government Offices, Newtown Road, Wexford, Y35 AP90
manager.dau@npws.gov.ie
www.gov.ie/housing

(6) Is there any update on the sediments behind Parteen Dam and any need for future dredging?

(7) Is there any survey data on the movement of otters upstream and downstream past Parteen Weir?

(8) Can the question of how it can be verified that the maximum rate of extraction is not exceeded during a drought be answered at this stage?

(9) Has there been a consultation with the Office of Public Works concerning the Lower River Shannon flood relief study?

(10) During drought conditions, is there any likelihood of impacts on the upstream River Shannon Callows SAC[1]?

(11) Wintering wildfowl can occur in numbers in Parteen Basin especially during inclement weather: Please update on any baseline data, and if available, do these data show birds from Lough Derg to be using Parteen Basin?

(12) The final question relates to the Water Treatment Plant (WTP) at Inchabeg (Co. Tipperary)[2], which is less than 1km upstream of the Kilmastulla River part of the Lower River Shannon candidate SAC[1]. The question relates to the discharges from construction and operation of the Treatment Facility with regard to:

   (a) The soil type present and controls proposed for avoiding release of sediment, during earthworks, into the drain(s) leading from the site into the Kilmastulla River;

   (b) The likelihood and assessment of an alternative WTP location outside the SAC catchment;

   (c) If it proposed to retain CFC[3] process wastes within the catchment of the Kilmastulla River, (a) the practicalities of using a constructed wetland to treat discharges from any settlement ponds, (b) if a walk-away closure is feasible when the plant is decommissioned, and (c) impacts of future on-site alum recovery.

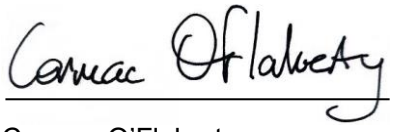
The Department appreciates the consultation, and is available for future consultations on the above if you wish.

[1] Special Area of Conservation.
[2] Preferred site, Site 1, as figured in Fig. 11.5 of the Jacobs / Tobin *Final Options Appraisal Report*.
[3] Coagulation, Flocculation, Clarification and filtration.

You are requested to send any further communications to this Department's Development Applications Unit (DAU) at manager.dau@npws.gov.ie, or to the following address:

The Manager
Development Applications Unit (DAU)
Government Offices
Newtown Road
Wexford
Y35 AP90

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Cormac O'Flaherty
Development Applications Unit
Administration
Tel: 01-2376003

Tionscadal Soláthair Uisce
Water Supply Project

Natura Impact Statement (NIS)

(Appendix E) IFI Correspondence

Document no: 32105801/EIAR/NIS/Appendix E
Version: Final

December 2025

Uisce Éireann
Irish Water

Jacobs

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Iascach Intíre Éireann
Inland Fisheries Ireland

Mr Aidan Rooney,
Principal Consultant,
Jacobs Engineering Ireland Ltd.,
Merrion House,
Merrion Road,
Dublin 4.

Date: 10/03/2016
Ref:

Re: Jacobs Tobin Informal Scoping Consultation on Irish Water, Water Supply Project, Eastern and Midlands Region: EIS & NIS – IFI interim commentary

Dear Mr Rooney,

On behalf of Inland Fisheries Ireland (IFI), I wish to acknowledge with thanks receipt of your letter dated 4th ult. and enclosures. IFI wish without prejudice to make the following preliminary observations in relation to the proposed Water Supply Project.

1 IFI note the emerging preferred raw water abstraction site identified in the River Shannon north of Ardnacrusha power station in an area known as the Parteen Basin.

2 IFI also note that a "least constrained 2 kilometre wide corridor" has been proposed within which the proposed pipeline from the Parteen Basin to the Peamount reservoir in South County Dublin will be constructed. This corridor should facilitate flexibility in choosing suitable watercourse crossing points so as to minimise potential impacts on fisheries waters particularly in relation to spawning and nursery areas.

3 In order to protect the fisheries resource, IFI require that instream works in fisheries waters only take place during the period July-September in any year. This is to avoid interference with the spawning migration and spawning process and to protect juvenile fish emerging from the gravels. It is essential that watercourse crossings where instream works are proposed are scheduled so that all works are completed before 30th September in any year. The IFI publication "*Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters*" which is available on the IFI website (www.fisheriesireland.ie/fisheries-and-construction-works (Right click on download button and select Save Target - save to desktop) sets out our requirements in relation to all instream and related works.

4 The timing constraints at 3 above do not apply to directional drilling which may take place at any time of year subject to agreement with IFI on a method statement and location of crossing points.

5 In designing the intake structure within the Parteen Basin, it is essential that appropriate screening arrangements are in place so as to prevent the admission of all fish species.

6 IFI is conscious that there are at least 14 alien species in the River Shannon. The movement or transfer of alien species to any other water body and any other River Basin must be

prevented. Accordingly, the abstraction and treatment process must be such as to ensure that all life stages of invasive species which may gain admission to the treatment works are destroyed.

7 IFI acknowledge that the planned maximum water abstraction will be 330,000m^3 per day. This figure should encompass all possible water losses through treatment, leaks in pipelines, evaporation from storage basins and secondary supply to the midland region.

8 Waste resulting from the water treatment process must be contained, treated and disposed appropriately in accordance with environmental legislation.

9 IFI note the proposed use of micro tunnelling/directional drilling to cross the named rivers, Nenagh, Brosna, Silver, Tullamore, Figile, and Liffey. Similarly, to ensure uninterrupted continuation of works and minimum impact on the aquatic habitat, we suggest this methodology for the Little Brosna, Clodiagh, Ballintotty, Kilmastulla, Black, Rapemills, Tuberfin, Fuarawn, Philipstown, Esker, Cushaling, Lyreen, Cloghcraun stream and Camcor River. (The Camcor River is particularly sensitive as it is the only spawning river for an important sub species of trout called Croneen trout. It is imperative that damage and disruption to the Camcor River and its tributaries is minimised.)

10 We note that it is proposed to supply approximately 99,000 m^3 per day to other communities in the midland region. This also means additional construction corridors to service other midland towns will have to be selected. The same constraints as indicated for the main pipeline to Dublin also apply to these satellite pipelines.

11 For the remaining minor streams and watercourses where it is proposed to use open cut and fill methodology, all works must be as outlined in Section 11 of our guidance document and in accordance with an agreed Method Statement. All crossing point locations must be agreed in advance with IFI. Where fish removal is required to facilitate these crossings, this work must be carried out by qualified personnel authorised by the relevant Minister under the Fisheries Acts.

12 IFI notes that the Grand Canal may also need to be crossed. Given that the canals are man-made structures, IFI suggest that crossing by directional drilling should be considered here too. Waterways Ireland are the responsible authority in this instance.

13 With regard to the location of 'Break Pressure Tanks' and 'Valve Chambers', any valves which may be opened to facilitate scouring of the pipeline from time to time must have suitable facilities to receive waste waters which will have to be dealt with in an appropriate fashion. In particular, the Total Residual Chlorine level in any discharges to fisheries waters shall not result in the receiving water level exceeding 0.005 mg/l HOCL. In this regard specific measures shall be put in place to store, treat and analyse any such chlorine bearing waters and certify their compliance with the prescribed standard before discharge.

14 Concerning temporary works and in particular temporary bridging works to facilitate access along the pipeline route, it is important that any temporary crossing points are either clear span or use large diameter pipes with a minimum diameter of 1.2 m. These pipes should be embedded at least 300 mm below natural bed level. Where a watercourse has a steep

gradient the use of pipe crossings may not be adequate to facilitate the free movement of fish and this type of steep gradient crossing will require a temporary clear span bridge.

15 All enabling works including topsoil stripping, access road installation, hedge removal and temporary site office construction must be detailed in a Construction Management Plan. This plan should ensure that good construction practices are adopted throughout the construction period and contain mitigation measures to deal with potential adverse impacts identified in advance.

16 Over the course of the pipeline routes associated with this development there is a strong likelihood that alien/invasive plant species will be encountered. A safe handling and eradication methodology should be developed in respect of each plant type likely to be encountered which should set out the actions required for safe disposal and to prevent their spread

17 In the preparation of a Construction Management Plan, particular account must be taken in relation to bio security. To prevent the spread of hazardous invasive species and pathogens, high pressure steam cleaning of all items of plant and equipment to be used at and adjacent to waters must be undertaken prior to use. All PPE must be disinfected prior to use.

18 IFI have been advised that Irish Water is considering the construction of a rock ramp at Parteen to facilitate the movement of fish from the River Shannon into Lough Derg. We would be obliged to have further details in this regard when available so that further comment can be made.

Should you require clarification on any of the above or require a consultation meeting with IFI personnel, please contact the undersigned.

Yours sincerely,

_____
Dr Greg Forde
Head of Operations

Iascach Intíre Éireann
Inland Fisheries Ireland

Mr. Aidan Rooney,
Principal Consultant,
Jacobs Engineering Ireland Ltd.,
Merrion House,
Merrion Road,
Dublin 4.

30th May 2016

IRISH WATER, WATER SUPPLY PROJECT EASTERN AND MIDLANDS REGION - ENVIRONMENTAL IMPACT STATEMENT (EIS) DRAFT SCOPING REPORT

Dear Mr. Rooney,

On behalf of Inland Fisheries Ireland (IFI), I wish to acknowledge with thanks receipt of your letters dated May 4th together with the EIS Draft Scoping Report Rev C dated 3rd May 2016. IFI have reviewed the Draft Scoping Report and wish to submit the following comments and observations which IFI consider relevant to the future development of the EIS and Natura Impact Statement.

Section 3.3 - Water Framework Directive

Impacts on water quality, quantity, ecology and hydromorphology should be assessed.

Section 3.10.1 - Content of the EIS

Impact of the abstraction on assimilative capacity in the river Shannon downstream of Parteen should be reviewed within the EIS

Section 5 - Noise and Vibration

Fish should be regarded as sensitive receptors in this section and should be included in the noise and vibration assessment.

Page 57 - 2nd last paragraph (1st sentence)

We do not consider that SSRS provides as useful and robust a result as Q values when undertaking Biological Water Quality Assessment, our preference would be for Q values only.

Page 57, 58 - Fisheries Surveys

i) Electro-fishing and fisheries / habitat surveys will be licensed by the Department of Communications, Climate Change and Natural Resources.

ii) Fisheries surveys should also include, European Eel, (*Anguilla anguilla*) Irish Pollan (*Coregonus autumnalis pollan*) and Croneen trout (*Salmo trutta*) a unique variant of brown trout.

Page 58 - 5th paragraph

i) Surveys for aquatic invasive species to include Parteen Basin.
ii) It seems a contradiction to propose aquatic invasive species surveys based on existing desktop data. We consider it more appropriate to undertake such survey at all watercourse crossing locations other than those being completed by trenchless methodology.

Section 8.3.1

Water abstraction for dust suppression is as an issue requiring consideration. Detail on the screening of pumps to exclude the entry of aquatic life should be addressed. The need to limit the use/discharge of such abstracted water to within the specific sub-catchment from where it was abstracted thus preventing the spread of invasive species must also be considered within the EIS.

Section 8.3.2 - Potential Operational Phase Impacts and Mitigation.

A thorough impact assessment of potential water level change and implications for biological diversity is essential. The statutory minimum flow for Parteen weir is 10 cumecs which has been recorded as too low to attract both silver eels and smolts downstream and therefore unacceptable from a fisheries management perspective. The upstream attraction from the weir for migratory salmon is also not acceptable.

(i) the descriptive text on **pages 59 and 60** does not specifically refer to use of and impacts of discharges of chlorine from the pipeline during e.g. cleaning and maintenance and should be included as an impact for consideration.

(ii) In designing the intake structure within the Parteen basin, it is essential that appropriate screening arrangements are in place so as to prevent the admission of all fish species into the abstraction area. This is particularly important in the context of small juvenile salmonids and salmon smolts which will travel through the area during March to May on their way to sea. In addition lamprey, eels, and the young of other coarse fish also need to be deterred from entering the abstraction area.
(iii) IFI is cognisant of the 14 different alien species that are currently thriving in Lough Derg. In particular IFI suggests that it would be prudent to prevent species such as Asian clam, the "Bloody red shrimp" and zebra mussels and others from entering into the abstraction area. IFI suggests that the excavation of the lagoon type structure in from the main river coupled with an infiltration mechanism to prevent the ingress of any of the above species into the abstraction area/lagoon should be developed and assessed.

(iv) The impact of light on fish, in particular spawning activity at the abstraction point should be addressed in the EIS.

Section 10.2.4

This assessment should include the streams that discharge to the lake and the potential impact of low lake levels on the mouths of these streams.

Section 10.3.1 (Page 78)

The potential for river/stream bed collapse during trenchless tunneling (and subsequent loss of flow) appears not to have been specifically identified as an issue requiring consideration and should be included in the EIS. IFI note the reference to potential for a waste slurry discharge.

Section 12.3 - Amenity (Page 89)

The overall impact on angling (and associated boat usage) and the provision for the safe access for anglers to access fishing rights along rivers / lake shore during the construction and operational phases should be addressed in the EIS. An assessment of the impact of reduced water levels on the lake as an amenity is required.

Iascach Intíre Éireann
Inland Fisheries Ireland

Section 10.3.2 (Pages 78 & 79)

The descriptive text on pages 78 and 79 does not specifically refer to use of and impacts of discharges of chlorine from the pipeline during, for example cleaning and maintenance and should be included as an impact for consideration.

The proposed EIS subject to the inclusion of the matters discussed above is satisfactory. Should you require clarification on any of the above or require a consultation meeting, please contact the undersigned at IFI Galway.

Yours sincerely,

Dr Gregory Forde
Head of Operations - IFI

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Uisce Éireann
Water Supply Project
PO Box 13748
Dublin 16

Iascach Intíre Éireann
Inland Fisheries Ireland

04.03.2025

Re. Public Consultation, Water Supply Project Eastern and Midlands Region

Dear Sir/Madam,

Inland Fisheries Ireland (IFI) is a Statutory Body established on the 1st July 2010. Under section 7(1) of the Inland Fisheries Act 2010 (No. 10 of 2010) 'the principal function of IFI is the protection, management and conservation of the inland fisheries resource'. Ireland has over 70,000 kilometres of rivers and streams and 144,000 hectares of lakes all of which fall under the jurisdiction of IFI. The agency is also responsible for sea angling in Ireland. IFI is mandated to ensure that the inland fisheries of the State are protected. To protect means to 'keep safe, defend, to shield from danger, injury or change'. 'Fisheries' includes all inland fisheries recreational and commercial, sea angling and mollusc fisheries stipulated under the Fisheries Acts (1959 - 2017), the physical habitat upon which the fishery relies, the facilities and access, the quantity and quality of the water, the plant and animal life on which fish depend for shelter and food and the spawning areas wherein fish deposit their eggs. The protective role of IFI relates to all aspects of the aquatic environment and all factors that influence the biotic communities within waters, which in any way relate to the propagation of fish populations.

Inland Fisheries Ireland believe that fish and the aquatic environment must be considered at all stages and across all elements of this project to ensure protection of the fisheries resource. Consultation with IFI must be on-going to allow data exchange and ultimately to maximise the environmental benefits of the project and to secure sustainable water management in the future.

The Living Planet Report (2020) highlights that of all biomes on the planet, populations of freshwater species have experienced the most severe decline, estimated at 84%. A second recent report, The World's Forgotten Fishes, finds that populations of migratory fishes have fallen by three-quarters in the last 50 years. This is also the case in Ireland with a decline of 90% in the numbers of returning Atlantic salmon since 1975, a greater than 90% decline in the European eel and sea lamprey now classified as near-threatened. The European Smelt (*Osmerus eperlanus*) is red-listed coastal/estuarine species that spawns in large numbers in spring along the vegetated walls of the Shannon River and tailrace through Limerick city. The Shannon is one of the key spawning populations of Smelt in Ireland. The Irish Pollan (*Coregonus pollan*) is a rare fish species unique to the Island of Ireland with its current known distribution being limited to five lakes, Lough Neagh, Lower Lough Erne, Lough Ree and Lough Derg (Rosell et al. 1997) and Lough Allen (Harrison et al. unpublished data). The Irish Pollan is a member of the whitefish family which contains other closely related species such as the Scottish Powan (*Coregonus lavaretus*). The Irish Pollan is also closely related to Arctic Cisco and in fact is descended from this Arctic white fish species separating from the main group some 160,000 years ago. It is thought that anadromous forms of the Arctic Cisco became landlocked and lake resident on the island of Ireland at the end of the last period of glaciation (Rosell et al. 2004). The Irish Pollan are a relatively short-lived species living to five years of age with few fish over this age being encountered (Rosell et al. 2004). Lough Neagh is now the only lake to contain a significant population of the Irish Pollan, with the populations in Lough Ree, Lough Derg and Lower Lough Erne having undergone a marked decline in the last century their levels are now 1% of their former levels (Rosell 1997; Harrod et al. 2002), (Rosell et al. 2004) and therefore any activity that could potentially threaten the population in the lake must be assessed in detail. The main perceived threats to Pollan include eutrophication, competition with introduced species, increased water temperature above thermal tolerances, land drainage and resultant siltation of lakes downstream of drained rivers (Griffiths 1997, Harrod et al. 2001). The threatened nature of these fish species makes them especially vulnerable to any additional pressures such as that which may arise from the current proposal.

Climate Change

This is one of the most significant water infrastructure projects to be developed in Ireland in a generation and it is key that sustainability now and in the future is central to project design and development. Climate change is predicted to cause increases in air temperature, heatwaves, dry periods/droughts and heavy precipitation events. The main impacts of climate change on fish species are predicted to be on their distribution, abundance, phenology (timing of important life events such as spawning, migrations, and hatching), species composition and community structure and dynamics. The fisheries-associated impacts also include altered flow regimes, increases in water temperature (and resulting decrease in oxygen concentration) and loss of habitat. Food-webs will also be altered with unpredictable consequences for fish production. Increasing risks of new invasive species and spreading of water-borne diseases provide additional concern. Additionally, the effects of existing anthropogenic pressures (e.g., nutrient enrichment, hydro-morphological changes, and invasive species) on freshwater environments and their fish species are likely to interact with climate change associated pressures (e.g., rising temperatures and droughts) and seriously affect freshwater fish species and other aquatic life. Current flow regimes and low-flow rates are unlikely to remain static into the future and Q95 flows have been simulated to decrease by over 40% by century end. Therefore, IFI believe it is key that this shifting baseline is incorporated into any abstraction regime and accounted for in any modelling of the potential impacts.

Abstraction

Inland Fisheries Ireland seek clarification as to what the abstraction scenario will be if flows into the Parteen basin reduce to 10 cumecs in drought conditions. Given this flow is also required for the compensation flow, will abstraction cease in this case? While there may be no impact on the lake if levels are maintained within the normal operating band there may be downstream effects on the ecology, environment and hydrology of the tailrace and the old channel. This will have potential implications for both up- and down-stream migrating fish and resident fish in the lower channel. Again, the contingency for this scenario needs to be clarified and mitigation measures defined and built into the operating procedures.

IFI also seek clarification about the process for future changes to the permitted abstraction rate if future demand exceeds forecasts, this should be addressed in any future planning application. IFI has serious concerns about the potential impacts of this abstraction on species such as Pollan which spawn in the shallow, rocky or littoral areas of lakes. Abstraction on the scale proposed has the potential to have considerable impact on the pollan populations of Lough Derg where additional shoreline and fringing habitat may become exposed due to a drop in lake levels.

In relation to the proposed abstraction the following issues should also be considered to assess potential impacts on the River Shannon, Parteen Basin and Lough Derg:

- IFI are concerned about extreme and extended drought periods and the potential impacts on ecology. Investigation and provision of alternative solutions for extended low flow dry periods should be undertaken. In particular, the commitment to 10 cubic metres minimum flow down the Old River Shannon and the potential for the future eflow study/regime for the Lower River Shannon Fish Passage plan to change this minimum flow. An allowance for this future increased flow requirement must be accounted for at this early planning stage.
- The impact on upstream water levels, ecology and flows within Parteen Basin and Lough Derg during periods where there is less than 10 cubic metres entering the basin must be considered. This should include the effects on aquatic flora and fauna, fish species and fish passage including salmon, trout, smelt, Croneen trout, lamprey species, pollan, cyprinid fish species, pike, eels and elvers.
- The effects of water level variation in rivers, lakes and tributary streams on trout and salmon spawning and the effects of lake level variation and effects on littoral zones must be fully investigated. These littoral zones represent important areas for pollan and coarse fish spawning.

- All elements of the project must be fully considered not only in economic, but also in environmental terms, including the economic costs of sustainable development and mitigation for potential habitat damage due to abstraction from the lake and in construction of pipeline crossings. Environmental considerations must be given equal weighting with socio and economic issues. (Local Government Agenda 21).
- This project involves the transfer of water between river catchments, clarification should be sought to determine if this is permissible under the Water Framework Directive and other relevant European legislation.
- Uisce Éireann must also ensure that abstraction regimes across the scheme catchment area are balanced and sustainable in their own right. Will this scheme, if approved, reduce the need for unsustainable abstractions in other river basins?
- In general measures and education initiatives must be put into place to limit waste of water, reduce leakage and improve network efficiency in receiving counties.
- A review of measures such as metering and bye-laws should take place to determine if these measures and controls are satisfactory. This would reduce the amount of water needed and reduce the waste of water within the networks. Targets should be set to reach industry standards.
- Any potential reduction in assimilative capacity resulting from this abstraction must be given due consideration. The effects of reduced assimilative capacity, which is especially important at low flows shall be considered. Any modelling must take into account other abstractions, existing and proposed along the Shannon system and existing and proposed discharges, such as licenced discharges, overflows from wastewater treatment plants and the associated impacts of reduced dilution. The potential for reduced headroom available shall also be considered.
- Consultations with IFI must be carried out during the EIAR Stage to discuss suitable mitigation measures. Surveys and modelling including but not confined to hydrological modelling of River Shannon, Parteen Basin and Lough Derg

should be undertaken for a range of conditions, particularly focused on low flows during extended drought periods and considering future eflow changes and climate predictions should be undertaken and made available to illustrate the storage volume/water level relationship for Lough Derg and Parteen Basin.

Infrastructure and Pipeline Construction

Inland Fisheries Ireland has serious concerns over the sustainability of a pipeline of considerable length (c. 170 km) which will cross many watercourses and could result in significant fisheries habitat loss or damage. There is also considerable risk to watercourses in terms of pollution from suspended solids, concrete and hydrocarbons during construction. The timing and methods used for any instream works or works in the vicinity of watercourses should be agreed with IFI in advance of works.

In relation to the proposed Water Treatment plant IFI has concerns about the disposal of the substantial amounts of waste such as sludge produced by the plant and the associated risks of pollution both during construction and operation of the plant. Construction works with a high risk of suspended solids pollution to watercourses should not be carried out between the 1st October and June 30th. The ecological integrity of all local surface waters (many of which are salmonid systems) must be protected at all times and there should be no net loss to fisheries and aquatic habitat or any deterioration in water quality arising from the construction or operation of the pipeline and this development with associated infrastructure.

Ground preparation and pipe-laying construction works have significant potential to cause the release of sediments and pollutants into surrounding waters. Pollution of the adjacent freshwaters from poor on-site construction practices could have a significantly negative impact on the fauna and flora of surface waters in this area.

As with any development, all preventative and mitigation measures necessary should be taken to ensure comprehensive protection of local aquatic ecological integrity, in the first place by complete impact avoidance and as a secondary approach through mitigation by reduction and remedy.

River crossings should be planned and executed in an environmentally sensitive way, preferably using tunnelling or boring techniques, unless specifically requested by IFI. All works should adhere to IFI's Guideline documents on road construction (attached) and Guidelines on protection of fisheries during construction work in and adjacent to waters http://www.fisheriesireland.ie/fisheries-and-construction-works. This document should be consulted by Uisce Éireann and associated contractors when planning works instream or in close proximity to watercourses. The maintenance of habitat integrity (both in-stream and riparian) is essential in safeguarding the ecological value of these important systems. Any works directly affecting watercourses or riparian habitats must first be submitted to IFI for assessment. Disturbance of in-stream habitats should be minimised.

Any in-stream works can only be carried out during the open season for salmonids (1st July – 30th September) of each year. A method statement for all riparian / in-stream works must first be submitted to IFI for approval. If stream diversions are necessary, electrofishing to remove fish from channel 'pre-diversion' may be required. If these works are carried out by a consultant then a Section 14. Licence will be required from the Inland Fisheries Section of DECC. Comprehensive surface water management measures must be implemented at the construction stage to prevent any pollution of streams in the area. On-site attenuation ponds may be required to allow for the settlement of fine/particulate materials out of potentially discharging surface waters from works areas. Precautions must be taken to ensure there is no entry of solids, during the connection of pipe-work, to the existing surface water system. The parameters set out in The European Communities (Quality of Salmonid Waters) Regulations of 1988 (S. I. No. 293, 1988) serve as a guide as to acceptable water quality conditions in salmonid systems.

Good housekeeping measures are integral to achieving prevention of excessive turbid run-off to surface water systems. The short-term storage and removal / disposal of excavated material must be considered and planned such that risk of pollution from these activities is minimised. Any channel / riparian areas that are impacted through implementation of the scheme must be fully reinstated subsequent to infrastructural development.

In relation to the testing and commissioning of pipes IFI has concerns over the filling of pipes from local watercourses and discharging of these waters following testing. This also has potential to be a cross-catchment transfer of waters. IFI notes that there are a number of proposed wash-out valves along the pipeline, IFI is concerned about the potential for pollution or leakage from these pipelines during testing and commissioning. Consideration needs to be given to methodology and the dewatering of any pipes/excavations which may contain directional drilling and water treatment chemicals and the associated and risk of pollution. Consultation will be required with IFI.

Inland Fisheries Ireland welcome the commitment given by Uisce Éireann to support future enhancement/rehabilitation works at crossing locations. IFI believe that the project should maximise all opportunities for environmental gain during the planning and construction of the project. Previous consultation has been undertaken with IFI on watercourse crossings and this should continue as the project progresses.

These represent the initial concerns and areas IFI feel need to be addressed. IFI reserve the right to make further submissions as the project continues and may highlight additional concerns should these arise. Inland Fisheries Ireland are available for and will welcome further consultation and engagement for the duration of the project.

Iascach Intíre Éireann
Inland Fisheries Ireland

Please do not hesitate to contact the undersigned should you require any clarification or have any queries. Any correspondence should be addressed to each of the undersigned.

Yours sincerely,

Jane Gilleran
Senior Fisheries Environmental Officer
Inland Fisheries Ireland, Shannon River Basin District
Ashbourne Business Park, Dock Road. Limerick V94 NPE0

Roisin O'Callaghan, Matt Carroll
Senior/Fisheries Environmental Officers
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Tionscadal Soláthair Uisce
Water Supply Project

Natura Impact Statement (NIS)

(Appendix F) BirdWatch Ireland Consultation February 2017

Document no: 32105801/EIAR/NIS/Appendix F
Version: Final

December 2025

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Irish Water

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Patron
Michael D. Higgins
President of Ireland

Éarlamh
Micheál D.Ó hUigínn
Uachtarán na hÉireann

14th February 2017

RE: Irish Water: Water Supply Project Eastern and Midlands Region Environmental Impact Statement - Scoping Report

To Whom It May Concern:

BirdWatch Ireland is very concerned with the scale of the potential impacts on birds and their habitats from source in the Lower River Shannon SAC and along the preferred route as described in the Scoping Report. We are concerned that this project is a result of an unsustainable planning legacy in Ireland creating an unquenchable need for water on the East coast but which will lead to serious impacts on communities of people and wildlife along the lower River Shannon and midlands. We request that we be kept abreast of developments in relation to this proposal. Below are some points which would need to be addressed in the next phase of environmental and ecological assessment.

1. It is very important that the extraction of water at Lough Derg does not impact on the ability of this waterbody to meet the requirements of the Water Framework Directive. It is also important that the interaction between the impacts on water quality and quantity and on the water dependent habitats and species protected under the Birds Directive and the Habitats Directive are assessed fully for impacts.
2. Any potential for impacts under Article 6(4) of the Habitats Directive should be planned well in advance to ensure that compensatory measures are put in place and functioning before any work is undertaken on the ground.
3. It will be imperative that the proposed project meets the requirements of Article 4(4) of the Birds Directive, that is that birds in the wider countryside, outside of SPAs, and in particular Annex 1 species, are not impacted. Particular care will be needed to ensure no impacts on Annex 1 migratory birds which winter in Ireland but also resident Annex 1 species including the Hen Harrier. The proposed route comes close to the Slieve Blooms Hen Harrier Special Protection Area. Care will be needed to ensure that construction work does not impact on foraging grounds for this species as well as potential nesting sites outside of the SPA. Please ensure that the results of the most recent Hen Harrier survey are included in your assessments. The National Parks and Wildlife Service would have this data.
4. Please ensure that there is an assessment of impacts to Red and Amber listed Birds of Conservation Concern in Ireland[1]. Again, this is important to comply with Article 4(4) of the Birds Directive.
5. In relation to datasets for this project please ensure that known Curlew breeding sites are included in the analysis. Curlew, which are red listed as a Bird of Conservation Concern in Ireland, are on the brink of extinction in Ireland with fewer than 150 breeding pairs left representing a 98% decline. The National Parks and Wildlife Service holds the data on known breeding sites. In addition, local bird survey data from the Countryside Birds Survey could also feed into the assessments. BirdWatch Ireland has this data.
6. BirdWatch Ireland recommends that fine scale habitat mapping is undertaken at site level for the proposed route so that detailed assessment of impacts is undertaken. For instance pockets of woodland, scrub, wet

[1] **Colhoun** K and **Cummins** S (2013), "Birds of Conservation Concern in Ireland 2014 –2019". Irish Birds. 9: 523—544 available here: http://www.birdwatchireland.ie/LinkClick.aspx?fileticket=EjODk32LNcU%3D&tabid=178

Directors: G Lyons, Chairman, D Fay, J Dowdall, B Lavery, J Lynch, T Culley, S Wilson

Registered charity no. 5703. BirdWatch Ireland is the trading name of the Irish Wildbird Conservancy, Cáirde Éanlaith Éireann, a company limited by guarantee.
Registered in Ireland, no. 116468. Registered office: Unit 20, Block D, Bullford Business Campus, Kilcoole, Co.Wicklow, Ireland.

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grasslands, species rich grasslands can be important local habitats for birds and other biodiversity including pollinators. If it is planned that there will be loss of these habitats, then a plan on providing compensatory habitats should be put in place as per the Environmental Liability Directive[2].

7. The impacts of soil compaction and any drainage activities from construction work will need to be assessed. These activities could result in permanent loss of wet grasslands and impacts on ground nesting birds such as breeding waders (Curlew, Lapwing, Snipe etc). The scoping report states that the land will be returned to its previous condition. **It will be very important that habitats are mapped at site level and that these habitats are not lost.**
8. Cumulative impacts of this project with other plans and projects will need to be assessed extremely carefully. This assessment should include the impacts of the proposed CFRAMS projects on the Shannon and on other water bodies along the route and within the study reach. Specific attention should focus on the potential impacts on waterbirds and any loss of wetlands in particular. Many migratory birds use wetlands and fields close to waterbodies in the midlands for roosting and foraging. These species are protected under the Convention on Migratory Species and must be protected.
9. All efforts must be made to ensure the minimum 'take' of mature hedgerow and scrub habitat. Compensation for this habitat loss should be ensured if loss is predicted. Hedgerow assessments should be undertaken to determine hedgerow quality and mitigate and compensate for these losses.
10. Works should not be undertaken during the breeding season for birds which currently set between March 1st and August 31st as per Section 40 of the Wildlife Act 1976 (amended 2000). The government is currently proposing to Change the dates for cutting of hedgerows from March 1st to July 31st. If this Bill passes through the Houses of the Oireachtas then the potential cumulative effects of this legal change and impacts to birds which breed in hedgerows especially red listed species such as Yellowhammer, will need to be assessed along with impacts from potential hedgerow loss through this large-scale scheme should be considered.
11. Strict biosecurity controls will need to be implemented to ensure that any soil to be imported on site does not contain vegetation or seeds from invasive plant or animal species.
12. Finally, it is unclear which entity would undertake the actual work on the ground for this project (e.g. local authorities or Irish Water), the required skills, specific and relevant expertise and knowledge for site based ecological assessments must be assured.

Please don't hesitate to get in touch in relation to these comments.

Regards,



Oonagh Duggan, Acting Head of Policy, Communications and People Engagement, Email: oduggan@birdwatchireland.ie

[2] DIRECTIVE 2004/35/CE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage

BirdLife INTERNATIONAL

Directors: G Lyons, Chairman, D Fay, J Dowdall, B Lavery, J Lynch, T Culley, S Wilson

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Tionscadal Soláthair Uisce
Water Supply Project

Natura Impact Statement (NIS)

(Appendix G) Parteen Basin Annex I Habitat Conformity

Document no: 32105801/EIAR/NIS/Appendix G
Version: Final

December 2025

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A Comparative Analysis of Parteen Basin with the Annex I Habitat

3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.

Paul Murphy
EirEco Environmental Consultants

9th March 2018

Introduction

The Lower River Shannon SAC (002165) does not include any Annex I lake habitats as qualifying interests. This report addresses the specific question of whether the Parteen Basin conforms to the habitat **3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp**. which is assessed on the basis of key characteristics recognized for the habitat.

Parteen Basin is one of sixteen lake water bodies that were designated as a heavily modified waterbody (i.e. a body of water which as a result of significant physical alterations by human activity, is substantially changed in character and cannot therefore meet good ecological status, e.g. dammed river) for Water Framework Directive purposes (South Western River Basin District Project, 2008). Despite this, Parteen Basin has been assigned an ecological status of Good in the 2010 to 2015 ecological classification of Irish lakes for the WFD (EPA, 2017).

The reservoir is approximately 4.5km in length, with a surface area of 360Ha and maximum depth of 22m. The lake is categorised as typology class 12 (as designated by the EPA for the purposes of the Water Framework Directive (WFD)), i.e. deep (>4m), greater than 50ha and high alkalinity (>100mg/l CaCO3) (Kelly et al, 2017).

Annex I Lake Habitats in Ireland

Five Annex I lake habitats are recognized as occurring in Ireland (O'Connor, 2015), namely:

- 3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)
- 3130 Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*
- 3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.
- 3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* — type vegetation
- 3160 Natural dystrophic lakes and ponds

In addition, the priority habitat 3180 * Turloughs is a sixth Irish standing freshwater Annex I habitat. O'Connor (2015) notes that more than one Annex I lake habitat can occur in a single lake, owing to the complex Irish geology.

A Detailed Description of Habitat 3140

Habitat 3140 is defined in O'Connor (2015) as *A habitat dominated by lower plants, notably cyanobacteria ('krustenstein') and diverse, abundant Chara species. Higher plants are limited in extent. The habitat is found on karstified limestone, other limestone and calcareous coastal sands and is typified by a marl substratum.*

Within the EU Habitat Interpretation Manual (2003), Habitat 3140 is described *as Lakes and pools with waters fairly rich in dissolved bases (pH often 6-7) (21.12) or with mostly blue to greenish, very clear, waters poor (to moderate) in nutrients, base-rich (pH often >7.5) (21.15). The bottom of these unpolluted water bodies are covered with charophyte, Chara and Nitella, algal carpets.*

Habitat 3140 is strongly associated with lowland lakes over limestone bedrock, particularly Dinantian pure bedded limestone. The habitat is also found on calcareous sand at the landward side of machair plains, along the north-western and western coast. The hard-water lake habitat is dominated by algae, particularly *Chara* species, but is also of international conservation importance for its krustenstein, a cyanobacterial crust that is found on bedrock, stones and cobbles in shallow waters to 2 m depth (Roden and Murphy, 2013). The crust is species rich, but the cyanobacterium *Schizothrix fasiculata* dominates in terms of abundance. A variant of the crust can also form on hard submerged peat and occasionally on loose pebbles forming rounded 'oncoliths'. A

very rare water beetle, *Ochthebius nilssoni* is associated with the krustenstein in a number of Irish hard-water lakes. Charophyte diversity is high in Irish 3140 lakes, and includes a number of rare and threatened species (Stewart and Church, 1992). A characteristic depth-related vegetation zonation has been described from Irish hard-water lakes, with up to six distinct zones (see Table 1) (Roden and Murphy, 2013, in prep.). This type of vegetation is uncommon in the EU and some of the best European examples occur in Ireland. As a result, Ireland has a special responsibility with respect to habitat 3140.

Where the characteristic zones occur (Table 1), higher plants are generally restricted to the *Chara rudis* zone and sheltered shorelines. Roden and Murphy (in prep.) noted that 3140 lakes with euphotic depth of greater than 8 m do not show the typical zonation, having *Chara contraria* dominating at mid and deep water, where *Chara rudis* and *Chara globularis/virgata* normally occur. Degraded hard-water lake habitats have abundant angiosperms, indistinct charophyte zones, loss of the characteristic deeper zones and damaged/decaying krustenstein.

The high alkalinity and calcium and magnesium concentrations of the hard-water lake habitat are often the result of significant groundwater contribution to these lakes. The catchments of many hard-water lakes are dominated by groundwater pathways, rather than surface run-off and rivers which may distinguish the hard-water lake habitat from other lake habitats

Table 1. The characteristic vegetation of the hard-water lake habitat (3140) (*after Roden and Murphy, 2014*).

Depth	**Vegetation unit**	**Characteristics**	**Core species**
Increasing depth	Krustenstein	Krustenstein with some small charophytes growing on rock and gravel	Krustenstein, *Littorella uniflora, Chara virgata* var. *annulata, Chara aspera*, *Ophrydium versatile*
	Chara curta	Communities dominated by *Chara curta*. These communities often extend into areas with sparse beds of *Phragmites* or *Schoenoplectus*, and other angiosperms may occur.	*Chara curta, Chara contraria, Chara aculeolata, Phragmites australis, Potamogeton gramineus, Utricularia vulgaris*
	Chara rudis	*Chara rudis* communities occur at mid depth both as monospecific beds or with a diverse array of angiosperms including *Hippuris vulgaris, Nuphar lutea, Myriophyllum verticillatum/spicatum*, large *Potamogeton* species or *Elodea canadensis*	*Chara rudis, Potamogeton* x *nitens, Potamogeton perfoliatus, Schoenoplectus lacustris*
	Chara globularis	Below the *Chara rudis* unit, *Chara globularis* or *Chara virgata* (see Roden and Murphy (2013), for discussion of *globularis* vs. *virgata*) can form extensive swards which extend to 8m below the surface	*Chara globularis, Chara virgata*
	Nitella flexilis/Chara denudata	The deepest macrophyte vegetation units consist of ecorticate charophyceae, either *Nitella flexilis* or *Chara denudata*; these communities extend to 9m depth.	*Chara denudata* or *Nitella flexilis*
	Oscillatoria	Mats of purple red *Oscillatoria* grow below the ecorticate charophyte zone close to the base of the euphotic zone. In places the mats are extensive, covering several square metres.	*Oscillatoria*

A Description of the Aquatic vegetation of Parteen Basin

A survey of the aquatic environment in the vicinity of the proposed WSP abstraction location was undertaken by EirEco Environmental Consultants on 21st August 2017.

The shallow upper shore zone (to approximately 0.5m) has cobbles covered with krustenstein, a blue-green algal crust associated with oligotrophic alkaline waters. The substrate has a dense covering of horned pondweed (*Zannichellia palustris*) with small amounts of stonewort (*Chara virgata*) (Figure 1). Willow moss (*Fontinalis antipyretica*) is present though primarily confined to the roots of fringing trees that are exposed on the lake shore. The invasive alien zebra mussel (*Dreissena polymorpha*) is occasional in small quantities on cobbles.

In water from 1.0 to 1.5m in depth, small amounts of stonewort are present, though much of it appears to be unrooted drift material. Yellow water lily (*Nuphar lutea*) and the submerged form of bulrush (*Schoenoplectus lacustris*) are occasional to frequent, and the submerged form of arrowhead (*Saggitaria sagittifolia*) forms isolated dense stands. Both shining pondweed (*Potamogeton lucens*) and perfoliate pondweed (*P. perfoliatus*) occur in small amounts along with Nuttall's pondweed (*Elodea nuttallii*). Cobbles still retain some krustenstein cover along with small amounts of zebra mussel.



Figure 1. Shallow water with horned pondweed, stonewort and Krustenstein.

In water from 1.5m to 2.5m in depth, both bulrush and arrowhead form dense stands with occasional clumps of yellow waterlily (Figure 2). The bulrush forms emergent reed beds while the arrowhead remains in submerged form. Both dominant species thin out towards 3.0m depth and small amounts of ivy-leaved duckweed (*Lemna trisulca*) occur on the lake bed. No macrophytes were recorded below 3.5m (euphotic depth) though zebra mussels were recorded in small amounts to 5m in depth, forming dense aggregations on hard substrate.

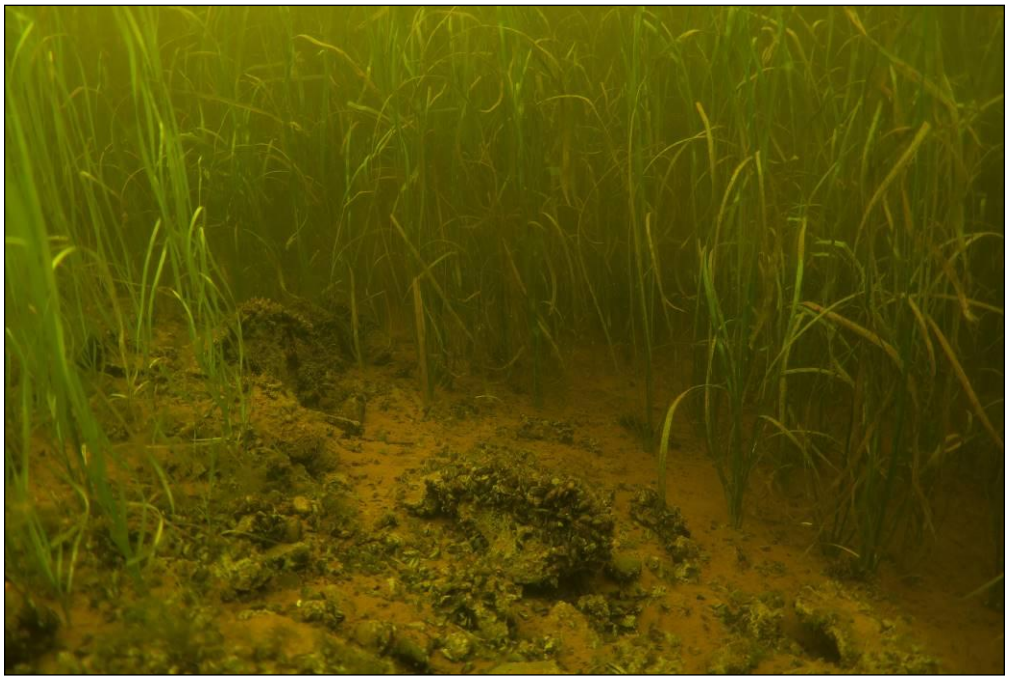


Figure 2. Beds of bulrush and arrowhead with zebra mussel in c3.m depth.

Elsewhere in the Parteen Basin, Starry stonewort (*Nitellopsis obtusa*) has recently been recorded in both Lough Derg and the Parteen Basin (Minchin et al, 2016). It forms extensive mono-typic stands covering several hectares in the north-west of the basin in depths of 3-5m, which is typically below the depth range of other macrophytes at this location. This is the first record of this species in Ireland and it would appear to be a naturalised non-native species. According to Minchin et al (ibid) Lough Derg is classified as a mesotrophic lake based on chlorophyll levels though water clarity may be mediated by the filtration of the non-native zebra mussel and Asian clam (*Corbicula fluminea*).

Geology of Lower Shannon Catchment

The catchment of the Lower Shannon is characterised by flat limestone plains, a small proportion of which are karstified to the east of Lough Derg, and the uplands of the Devil's Bit Hills in the southeast, the Slieve Aughty Mountains in the west and the Slieve Bearnagh and Arra Mountains in the south. All of these upland areas are underlain by old red sandstone with metamorphic and volcanic rocks in the higher summit areas.

The Parteen Basin is underlain primarily by the Ballysteen Formation, a dark muddy limestone shale (https://dcenr.maps.arcgis.com) overlain by quaternary sediments and till deposits. There is no exposed karstified limestone in the vicinity of the basin.

Water Chemistry in the Parteen Basin

The Parteen Basin water chemistry is considered hard (>100mg/l CaCO3) and it is classified as mesotrophic nutrient status with high total ammonia, phosphorous and chlorophyll levels recorded over the period 2010-2015 (www.catchments.ie). As part of the Water Supply Project Eastern and Midlands Region – Lough Derg Monitoring Project, the following water chemistry results were recorded the sample site WTMS-4 (Parteen basin) during the period 2015-2017.

- pH 8.25 to 8.41
- Alkalinity 170-210 mg/l
- Calcium 60.8-86mg/l
- Magnesium No data

Conservation Condition Assessment of Habitat 3140

Roden and Murphy (2013) developed a method for assessing the conservation condition of habitat 3140 using structural and functional elements which were further refined (Roden and Murphy, in prep) as follows:

1. Euphotic depth, measured by snorkelling, (0-4 m = bad, 5-6m = poor, >6m = good)
2. Secchi depth (0-2 m = bad, 2-4m = poor, >4m = good)
3. Krustenstein (absent = bad, overgrown or decaying = poor, present = good)
4. Charophyte zones (absent = bad, 1-2 = poor, > 3 = good)
5. Angiosperms (throughout euphotic zone = bad, confined to surface and *Chara rudis* zone = good)

Comparative Analysis of Parteen Basin with the Annex I Habitat 3140

Parteen Basin is a heavily modified water body, effectively a reservoir which is underlain by dark muddy limestone shale overlain by quaternary sediments and till deposits. There is no exposed karstified limestone in the vicinity of the basin. Thus, the basin does not conform to the standard classification of Habitat 3140 as a natural water body in a karstified limestone environment.

Using the combination of the key indicators defined for Habitat 3140 above, a comparative analysis of the conformity of Parteen Basin to the Annex I habitat is presented in Table 2. From this analysis it can be seen that Parteen Basin has a euphotic depth outside of the range expected for Habitat 3140, does not support any zonation in Charophytes, and is dominated throughout by angiosperms. It does support a thin covering of krustenstein and a limited amount of charophyte growth which is indicative of its high alkalinity. Overall however, the Parteen Basin does not conform to the Habitat 3140. It is a heavily modified water body, dominated by a range of invasive alien species.

Table 2. Comparative analysis of Parteen Basin to key condition metrics of Habitat 3140.

Metric	Habitat 3140	Parteen Basin
Euphotic depth	4-6m	3.5m
Secchi depth	2-4m	2.0m
Krustenstein	Present	Present
Charophyte zonation	Present	Absent
Angiosperms	confined to surface and *Chara rudis* zone	Dominant throughout

Conclusion

Parteen Basin does not conform to the Habitat 3140. It is a heavily modified water body with a high alkalinity, dominated by a range of invasive alien species.

References:

O Connor, Á. (2015). *Habitats Directive Annex I lake habitats: a working interpretation for the purposes of site-specific conservation objectives and Article 17 reporting*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

Kelly, F.L., Connor, L., McLoone, P., Morrissey, E., Kelly, K., Delanty, K., Coyne, J., Corcoran, W., Cierpial, D., Matson, R., Gordon, P., O' Briain, R., Rocks, K., O' Reilly, S., Puttharee, D., McWeeney, D., Robson S. and Buckley, S. (2017). *Fish Stock Survey of Parteen Basin, June 2016.* National Research Survey Programme, Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

Roden, C. and Murphy, P. (2013). *A survey of the benthic macrophytes of three hard-water lakes: Lough Bunny, Lough Carra and Lough Owel.* Irish Wildlife Manuals, No. 70. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Roden, C. and Murphy, P. (2014). *Targeted survey of Najas flexilis.* Unpublished Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

Roden, C. and Murphy, P. (in prep.). *Monitoring of hard-water lakes in Ireland using charophytes and other macrophytes.* Unpublished Report to National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Water Supply Project Eastern and Midlands Region – Lough Derg Monitoring Project (LDMP). *Data report for Lough Derg Monitoring Project* (March 2017 – May 2017).

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Water Supply Project

Natura Impact Statement (NIS)

(Appendix H) WSI Parteen Survey

Document no: 32105801/EIAR/NIS/Appendix H
Version: Final

December 2025

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Water Supply Project: Eastern and Midlands Region

Parteen Basin, Co. Tipperary



Final Report

July 2016

By
Wetland Surveys Ireland Limited

For
Tobin Consulting Engineers

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Annex 1: Relevé Data

1 Introduction

Wetland Surveys Ireland were commissioned by Tobin Consulting Engineers to undertake a botanical survey of lands (woodland) at Garrynatineel, Parteen, County Tipperary (labelled as RAW 2.1 and 2.2 in Figure 1 below) and lands (grasslands) at Cloonfadda to the south of Killaloe, County Clare (labelled as RAW 1.1 and 1.2 in Figure 1). The aim of the survey was to determine the ecological interest of the sites and in particular to assess any correspondence with habitats listed on Annex I of the EU Habitats Directive (EEC 1992).

The survey was undertaken by Dr Peter Foss, an experienced botanist, on the 17th of June 2016.

2 Methods

During the course of the survey habitats present at each site were classified according to Fossitt (2000) and where relevant according to Annex I of the EU Habitats Directive.

General survey target notes were recorded on a GPS enabled field computer running a GIS (Geographic Information System) software application (ESRI (Environmental Systems Research Institute) Collector for ArcGIS). These notes referred to features of interest within the site.

Where appropriate, representative vegetation quadrats (or relevés) were recorded. This represents a standard approach to vegetation description and analysis. Quadrats were recorded in a digital database (FileMaker Pro software application) running on a GPS enabled field computer. All plant species within the quadrat were recorded and cover abundance value applied. The Domin scale (Domin 1923) of cover abundance was used during the study as follows:

+: 1 individual, no measureable cover
1: <4% cover, with few individuals
2: <4% cover, with several individuals
3: <4% cover, with many individuals
4: 4-10% cover
5: 11-25% cover
6: 26-33% cover
7: 34-50% cover
8: 51-75% cover
9: 76-90% cover
10: 91-100% cover

A range of physical attributes were also recorded within each quadrat (e.g. slope, aspects, grazing impacts, soil type, soil/peat depth, substrate stability, cover and height values for different plant groups, diameter at breast height (dbh) for trees etc.).

A photographic record of each quadrat was taken. Photographs were geotagged to facilitate their incorporation into a GIS. Additional photographs were also taken at regular intervals during the field survey to assist with subsequent interpretation and to record features in the wider landscape.

All vegetation quadrat data collected during the survey is presented as a series of quadrat reports in Annex 1. Additional detailed spatial data recorded during the survey has been submitted to Tobin Consulting Engineers in GIS format.

The National Roads Authority (NRA) Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009) was used to inform an assessment of the biodiversity value of each site.

In order to inform a determination as to whether a habitat was of Annex quality or had any correspondence with Annex I habitats, the following references were consulted:

- A Guide to Habitats in Ireland, Fossitt (2000)
- National Survey of Native Woodlands, Perrin et al. (2008)
- The Irish semi-natural grasslands survey 2007-2012. Irish Wildlife Manuals, No. 78, O'Neill et al. (2013)
- The Status of EU Protected Habitats and Species in Ireland, NPWS (2013)
- Interpretation manual of European Union Habitats. Version EUR 28, European Commission (2013)



Figure 1: Map showing sites subject to survey.

3 Results

3.1 Site RAW2.2

The western part of Site RAW2.2 comprises a failed spruce conifer plantation with many windblown conifers and a regenerating scrub woodland of willow and hazel (Mixed broadleaved conifer woodland (WD2)). Numerous conifers survive in this area. The site has very poor ground flora and is subject to occasional sheep grazing.

This area was previously surveyed as part of the NPWS National Survey of Native Woodland (NSNW) (Perrin *et al.* (2008)). The site was mapped as Oak-ash-hazel woodland (WN2) following that survey. Based on the species composition currently present at the site, this classification is deemed incorrect for site RAW 2.2. The site lies within the Lower River Shannon SAC (NPWS Site Code: 002165) and is separated from the more natural Ash-hazel woodland (WN2) to the north by a damaged barbed wire fence, although the fence continues to keep sheep out of the better northern woodland area. Despite the designated status of the site, the woodland habitat itself is of low ecological value due to past conifer planting and associated effects of same, and does not qualify as 91E0 Alluvial Woodland. The adjacent woodland to east is a dense mature spruce plantation of low value.

Data from a vegetation relevé recorded from this site is presented in Annex 1. Further data in the form of survey target notes has been submitted to the client in GIS format.

In conclusion, the woodland habitat is located within the Lower River Shannon SAC and therefore according to the NRA (2009) can be deemed to be of international conservation importance. However, the woodland does not correspond with any EU Annex I habitat and comprises modified mixed broadleaved conifer woodland of low ecological interest.

3.2 Site RAW2.1

Site RAW2.1 (and the area between the two possible extraction areas, north of the fence point) is an area of mature ash and hazel woodland (WN2). The woodland has a very diverse and natural ground and moss flora, with some low lying damp areas. Old field boundaries occur within the woodland, many with badger setts. This WN2 area was rated as being of moderate woodland value by NSNW (Perrin et al. 2008).

This area is of higher ecological value than the alternative site RAW2.2 described in the previous section. There is also a significant rise of some 6-8 m in the land at the eastern end of the woodland area. The woodland is of moderate to high ecological value. It was defined as WN2, non-Annex by the NSNW (Perrin *et al.* (2008), although in parts it may have some affinities with the EU 91E0 Alluvial woodland habitat type, but for the dominance of hazel and the lack of alder.

Data from a vegetation relevé recorded from this site is presented in Annex 1. Further data in the form of survey target notes has been submitted to the client in GIS format.

In conclusion, the semi-natural woodland habitat present at the site is located within the Lower River Shannon SAC and therefore according to the NRA (2009) is part of a site deemed to be of international conservation importance. The woodland has no direct correspondence with any EU Annex I habitat although has some affinities to the EU 91E0 Alluvial woodland habitat type.

3.3 Sites RAW1.1 and RAW1.2

These grassland sites occur on the western side of the River Shannon (see RAW 1.1 and 1.2 in Figure 1 above) in the townland of Cloonfadda . Site RAW 1.1 is located entirely within the Lower River Shannon SAC while RAW 1.2 is partly located within the SAC. All of the agricultural fields were dominated by partially improved wet grassland that were grazed by cattle. Some fields were recently topped and the grassland exhibited signs of past reseeding and fertilisation. These grassland areas were considered to be of low ecological value and have no correspondence with EU Annex I habitats.

In conclusion, the semi-natural woodland habitat present at the site is located within the Lower River Shannon SAC and therefore according to the NRA (2009) is part of a site deemed to be of international conservation importance. The grassland itself is of low ecological value corresponding with improved agricultural wet grassland.

Further data relating to these fields has been submitted to the client in GIS format.

4 References

Domin K. (1923) Problémy a metody rostlinné sociologie a jejich použiti pro výzkum lučnich a pastvinæch porosto Republiky Ceskoslovenské [Problems and methods of plant sociology and their application for the analysis of meadows and pastures]. Publ. Min. Zem. 1923; 39: 1-376.

European Economic Community (EEC). 1992. Council directive 92/43EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Official Journal L206:7–50.

EU Commission (2013). Interpretation manual of European Union Habitats. Version EUR 28, European Commission.

Fossitt, J. (2000) A Guide to Habitats in Ireland. The Heritage Council, Ireland.

Perrin et al. (2008). National Survey of Native Woodlands.

NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Overview Volume 1. Unpublished Report, National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin.

NRA (2009). Guidelines for Assessment of Ecological Impacts of National Road Schemes (Revision 2).

O'Neill, F.H., Martin, J.R., Devaney, F.M. & Perrin, P.M. (2013) The Irish semi-natural grasslands survey 2007-2012. Irish Wildlife Manuals, No. 78. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

Perrin, P., Martin, J., Barron, S., O'Neill, F., McNutt, K. & Delaney, A. (2008) Survey of Native Woodlands 2003-2008. Volume 1:Main Report. A report submitted to the National Parks and Wildlife Service by Botanical, Environmental & Conservation Consultants Ltd.

Annex 1 – Relevé Data

Quadrat Description

Water abstraction location: RWA2.2. Area on central pipeline route beside lake. Mixed deciduous conifer woodland with standing and fallen spruce (WD2). Appears to be a failed conifer plantation, with wind thrown conifers and secondary hazel / willow scrub regeneration. No evidence of flooding. Some sheep grazing seen in past by previous survey teams. No tree seedling regeneration. Some evidence of ditching associated with past spruce planting. Mosses mainly on fallen dead timber. Many spuce have fallen over. Some rubble dumped in area. Rocks protruding in parts. Ash and spruce dominant trees, hazel and willow understory. Poorly developed woodland ground flora.

Habitat Type

WD2 Mixed broadleaved/conifer woodland

EU Habitat Quality

The habitat present on site does not correspond to EU habitat type.



Quadrat Number: 1

Photograph Numbers
samsung and GIS collector

Approx Location
Latitude = 52.781934 (north)
Longitude = -8.445065 (west)

Survey Date 17/06/2016

Surveyors
Peter Foss

Substrate Type Mineral Soil

Stability Very firm

Substrate Depth na

Slope Degrees flat

Aspect NA

Water Table Depth cm	Below surface
Comments on Hydrology	No evidence of inundation from lake.

Quadrat Management	None
Adjacent Landuse	Reservoir
Grazing Comments	Area grazed by sheep

General Faunal Observations
none

Structure Quadrat Cover Values %

Total Vegetation cover	95	**Litter cover**	75
Tree cover	45	**Algae cover**	0
Shrub cover	60	**Rock cover**	5
Herb Grass cover	60	**Bare peat / Soil cover**	<5
Bryophyte cover	65	**Open Water cover**	0

Height of vegetation cm	20 m	**Height Shrub layer cm**	10 m
Height Tree layer cm	15-20 m	**Height Herb layer cm**	50

Species Latin Name	Species English Name	Species cover (Domin)
Angelica sylvestris	Wild Angelica	1
Blechnum spicant	Hard-fern	1
Brachythecium rutabulum	Moss	4
Carex remota	Remote Sedge	3
Circaea lutetiana	Enchanter's-nightshade	4
Corylus avellana	Hazel	6
Dactylis glomerata	Cock's-foot	2
Deschampsia cespitosa	Tufted Hair-grass	2
Digitalis purpurea	Foxglove	3
Dryopteris affinis	Scaly Male-fern	3
Dryopteris dilatata	Broad Buckler-fern	3
Equisetum arvense	Field Horsetail	2
Eurhynchium striatum	Common striated feather moss	3
Fissidens sp.	Moss	3
Fraxinus excelsior	Ash	4
Geranium robertianum	Herb-Robert	2
Hedera helix	Ivy	3
Hypericum androsaemum	Tutsan	2
Lonicera periclymenum	Honeysuckle	3
Lysimachia nemorum	Yellow Pimpernel	1
Pellia epiphylla	Liverwort	2
Picea sitchensis	Sitka Spruce	6
Polystichum setiferum	Soft Shield-fern	3
Polytrichastrum formosum	Wood Haircap	3
Prunus spinosa	Blackthorn	3
Rubus fruticosus agg.	Blackberry	4
Thuidium tamariscinum	Moss	4

Quadrat Description

Water abstraction location: RWA2.1. Ash hazel woodland with wet hollow and dry areas (WN2). Good tree regeneration of ash and holly in ground layer. No evidence of grazing, although 1 set of deer prints found within quadrat. Wetter bare hollows with bare organic or mud base occur throughout the woodland. Few wetland plants present. Adjacent low elevated ridges occur to 20-30 cm higher than the damp hollows, with good woodland moss, herb and bramble/ivy cover. Ash tree dbh to 50 cm, hazel to 35cm. Badger set 10 m away from quadrat on earth bank. Well developed woodland ground flora.

Habitat Type

WN2 Oak-ash-hazel woodland

EU Habitat Quality

The habitat present on site does not correspond to EU habitat type.



Quadrat Number: 2

Photograph Numbers
samsung and GIS collector

Approx Location
Latitude = 52.784512 (north)
Longitude = -8.442409 (west)

Survey Date 17/06/2016

Surveyors
Peter Foss

Substrate Type Mineral

Stability Firm

Substrate Depth 20cm in

Slope Degrees Level

Aspect NA

Water Table Depth cm	Below surface in
Comments on Hydrology	Probably localised impeded drainage in hollows during winter, but no evidence of inundation from lake.

Quadrat Management	None
Adjacent Landuse	Forestry - broadleaved and conifers (to the east)
Grazing Comments	No evidence of grazing

General Faunal Observations
Deer possibly Sika, Badger.

Structure Quadrat Cover Values %

Total Vegetation cover	100	**Litter cover**	10
Tree cover	65	**Algae cover**	0
Shrub cover	75	**Rock cover**	0
Herb Grass cover	20	**Bare peat / Soil cover**	25
Bryophyte cover	60	**Open Water cover**	0

Height of vegetation cm	20 m	**Height Shrub layer cm**	12 m
Height Tree layer cm	20 m	**Height Herb layer cm**	to 100

Species Latin Name	Species English Name	Species cover (Domin)
Arum maculatum	Lords-and-Ladies	2
Asplenium scolopendrium	Hart's-tongue Fern	1
Brachythecium rutabulum	Moss	5
Caltha palustris	Marsh-marigold	1
Carex remota	Remote Sedge	3
Chrysosplenium oppositifolium	Opposite-leaved Golden-saxifrage	3
Circaea lutetiana	Enchanter's-nightshade	3
Corylus avellana	Hazel	8
Crataegus monogyna	Hawthorn	4
Dryopteris affinis	Scaly Male-fern	3
Dryopteris dilatata	Broad Buckler-fern	3
Eurhynchium striatum	Common striated feather moss	5
Fraxinus excelsior	Ash	8
Geum urbanum	Wood Avens	3
Hedera helix	Ivy	5
Ilex aquifolium	Holly	4
Isothecium myosuroides	Moss	4
Kindbergia praelonga	Common feather moss	4
Listera ovata	Common Twayblade	2
Lonicera periclymenum	Honeysuckle	4
Mnium hornum	Moss	3
Polypodium vulgare	Polypody	2
Polystichum setiferum	Soft Shield-fern	3
Potentilla sterilis	Barren Strawberry	3
Prunus spinosa	Blackthorn	3
Rubus fruticosus agg.	Blackberry	5
Sanicula europaea	Sanicle	3
Thuidium tamariscinum	Moss	5
Viola riviniana	Common Dog-violet	3

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Natura Impact Statement (NIS)

(Appendix I) John Cross Parteen Survey

Document no: 32105801/EIAR/NIS/Appendix I
Version: Final

December 2025

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Water Supply Project
Assessment of the Woodland near Parteen Weir

Final Report

I visited the site of the proposed water supply project on 27th October 2016 in the company of Brian Deegan, Irish Water, and Chris Walsh and Alan Booth, ecologists with TOBIN Consulting Engineers. The site lies in the townland of Garrynatineel, Co. Tipperary, R699702, on the shores of the reservoir created when the Shannon was dammed at Parteen (Parteen Basin). Two sites have been selected as possible extraction points. The principal site of interest is RWA 2.2 but RWA 2.1 was also visited for comparison. A detailed ecological survey of the sites was not undertaken as this had already been done by Peter Foss, Wetland Surveys Ireland Ltd., in June 2016.

Site RWA 2.2.
This area is an old conifer plantation, largely wind-thrown, in which native species have become established. The land is elevated about 1m above the height of the adjacent reservoir and is more or less level but uneven, with cultivation ridges, probably dating from the time of planting of the conifers. The conifers are probably about 40 years old. The principal species in the canopy are Sitka spruce (*Picea sitchensis*)[1] and sally (*Salix cinerea*) with occasional ash (*Fraxinus excelsior*) and, rarely, alder (*Alnus glutinosa*). The thin shrub layer consists of hazel (*Corylus avellana*) with a little hawthorn (*Crataegus monogyna*). The ground flora is poorly developed with wood sorrel (*Oxalis acetosella*) and locally bracken (*Pteridium aquilinum*) being the principal species.

Site RWA 2.1
This area was examined as a comparison to RWA 2.2. It is topographically diverse with banks up to 2m high on the eastern and western side, the latter possibly a result of the development of the dam and hydroelectric scheme built in the 1920's. Between the banks is a broad, low-lying area subject to impeded drainage, with small areas of standing water and a small, ill-defined stream.

This is an excellent example of mixed ash-hazel woodland (Fossitt (2000) category WN2). Ash is the dominant canopy species, with sally, pedunculate oak (*Quercus robur*), sycamore (*Acer pseudoplatanus*) and locally alder. The understorey consists of hazel, hawthorn and regenerating ash. There is a rich and diverse field layer reflecting the variety of wet and dry substrates. The relevé provided by Foss accurately reflects the vegetation.

Characteristics of alluvial woodland in Ireland
Alluvial woodland in Ireland is not well defined and this poses difficulties in site evaluation and in assessing the impacts of developments. Part of the problem lies in the fact that the term is more geographical than botanical in that alluvial woodland is subject to, and influenced and determined by, periodic inundation. Further, the Habitats Directive is very much focussed on mainland Europe that has habitats and species that are absent from Ireland, while Ireland has habitats that do not fit easily into the Habitats Directive definitions, e.g. lake-side woodlands.

[1] Nomenclature follows Preston *et al* 2002

Alluvial woodlands in Ireland occur principally in areas of deposition in the lower reaches of rivers and around lakes (and locally elsewhere) and their character is determined by a number of factors: duration, height and periodicity of floods; the substrate (usually alluvium but sometimes sands and gravels); and the height of the groundwater. Flooding may occur frequently and at least annually, or infrequently at intervals of several years but the inundation will nonetheless determine the vegetation. The duration of flooding can vary from a few hours (in the case of tidal flooding) to days, weeks or even months. Given the highly irregular rainfall patterns in Ireland flooding can occur at any time of the year, although it is more common in the autumn and winter.

Alluvial woodlands in Ireland are assigned to the Habitats Directive category 91EO 'Alluvial forests with alder (*Alnus glutinosa*) and ash (*Fraxinus excelsior*)'.

As defined in the Interpretation Manual, 91EO includes 2 principal types in Ireland:

1. *'Riparian forests of ash (*Fraxinus excelsior*) and alder (*Alnus glutinosa*) of temperate and Boreal Europe lowland and hill watercourses* (Alno-Padion)
2. *Arborescent galleries of tall willows (*Salix alba, S, fragilis*) and black poplar (*Populus nigra*), along medio-European lowland, hill or sub-montane rivers* (Salicion albae)'.

All types occur on heavy soils (generally rich in alluvial deposits) periodically inundated by the annual rise of the river (or brook) level, but otherwise well-drained and aerated during low-water. The herbaceous layer invariably includes many large species (meadowsweet, angelica, cuckoo flower, wood dock, sedges) and various vernal geophytes can occur, e.g. celandine, wood anemone'.

*This habitat includes several sub-types: ash-alder woods of springs and their rivers (*Carici remotae-Fraxinetum*); ash-alder woods of fast-flowing rivers (*Stellario-alnetum glutinosae*); white willow gallery forests (*Salicion albae*).'*

Based on the National Survey of Native Woodlands (Perrin *et al* 2008) five alluvial woodland vegetation types have been identified in lowland situations within Ireland:

1. Woodlands of alder and ash, often with sally, along lowland reaches of slow flowing rivers.
2. Woodlands of alder, ash and sally around lake shores.
3. Woodlands of alder, ash and sally around springs and seepage areas associated with river or lakes.
4. Woodlands of (narrow-leaved) tree willows alongside slow-flowing reaches of large rivers, often in reaches subject to tidal influence.
5. Woodlands of pedunculate oak and ash sometimes with alder.

Further details of these woodland types are given in Annex 1.

Assessment of the sites

The woodland in Site RWA 2.2 might be expected to fall into the Habitats Directive type *'Riparian forests of ash (*Fraxinus excelsior*) and alder (*Alnus glutinosa*) of temperate and Boreal Europe lowland and hill watercourses* and types 1 or 2 listed above. However, the water level in the reservoir is controlled by the dam and only fluctuates by about 45 cm. The water level on the day of the survey was c. 33.27 m. This is c.0.13 m lower than at Killaloe on the same day and 0.93 m below the highest level recorded at Killaloe since 1932.

Consequently, given the height of the woodland above the water level it would not appear to be subject to flooding even at times of highest flood. This is confirmed by the vegetation, which does not conform to any of the vegetation types above, even allowing for the dominance of Sitka spruce, as well as by the absence of detritus, which is characteristically left by high water. Further, the National Flood Hazard Map shows no record of flooding in this area since 1954, despite extensive flooding along the Shannon in recent years.

I therefore agree with the opinion of Peter Foss, that the vegetation of the site is not alluvial woodland but conforms to mixed deciduous conifer woodland (Fossitt category WD2) that is gradually reverting to ash-hazel woodland.

RWA 2.1 contains a wet depression with vegetation which in places has similarities to alluvial woodland. However, it appears likely that the area is influenced by seepage or run-off from the land to the east rather than by flooding from the river/reservoir. Consequently, I conclude that, although it is of high ecological value, it also does not conform to alluvial woodland.

John Cross BSc. Ph.D.
28 March 2017

References

Fossitt, J. (2000). A guide to habitats in Ireland. The Heritage Council. Kilkenny.
Perrin, P., Martin, J., Barron, S., O'Neill, F., McNutt, K. & Delaney, A. (2008). National Survey of Native Woodlands 2003–2008. A report submitted to the National Parks & Wildlife Service. Department of the Environment, Heritage & Local Government, Dublin.
Preston, C.D., Pearman, A. & Dines, T.D. (2002). New atlas of the British and Irish flora. Oxford University Press.

Annex 1

The following alluvial woodland types can be found in lowland Ireland:

1. Woodlands of alder and ash, often with sally, along lowland reaches of slow flowing rivers, subject to prolonged periods of flooding, i.e. several weeks or even months. The soils are often poorly drained and may remain wet for long periods. Alder and ash form the canopy with an abundance of sally. Sometimes sally may dominate forming a tangle of fallen stems. Hawthorn (*Crataegus monogyna*) is often abundant. The herb layer is luxuriant with species such as meadowsweet (*Filipendula ulmaria*), marsh marigold (*Caltha palustris*), canary reed-grass (*Phalaris arundinacea*), water mint (*Mentha aquatica*), marsh bedstraw (*Galium palustre*), yellow flag (*Iris pseudacorus*) and valerian (*Valeriana officinalis*). Bramble (*Rubus fruticosus* agg.) may dominate in drier locations.

2. Woodlands of alder, ash and sally, sometimes with purging buckthorn (*Rhamnus cathartica*) around lake shores subject to prolonged flooding, i.e. several weeks or even months, following a rise in lake level or ground-water level. The soils may be poorly- to well-drained. The vegetation is similar to 1. above but is typically more species-rich with, e.g. purple loosestrife (*Lythrum salicaria*), yellow loosestrife (*Lysimachia vulgaris*) and tussock-forming sedges, e.g. *Carex elata*.

3. Woodlands of alder, ash and sally around springs and seepage areas associated with river or lakes. The soils are poorly drained and remain wet throughout the year. Species-rich woodland typically dominated by ash, alder and occasional pedunculate oak (*Quercus robur*) with hawthorn and hazel (*Corylus avellana*). The field layer includes remote sedge (*Carex remota*), lady fern (*Athyrium filix-femina*), creeping buttercup (*Ranunculus repens*), herb-Robert (*Geranium robertianum*), enchanter's nightshade (*Circaea lutetiana*), opposite-leaved saxifrage (*Chrysosplenium oppositifolia*). Locally there may be stands of tussock sedge (*Carex paniculata*).

4. Woodlands of (narrow-leaved) tree willows (e.g. *Salix alba, S. viminalis, S. fragilis*) alongside slow-flowing reaches of large rivers, often in reaches subject to tidal influence. The soils are permanently wet and the trees are subject to frequent inundation. These so- called 'gallery forests' form a distinctive landscape feature alongside the larger rivers, mostly in the south and east. Tree willows predominate but sally and alder are rare. The field layer is characteristically a dense tangle of nettle (*Urtica dioica*), canary reed-grass, water dropwort (*Oenanthe crocata*), angelica (*Angelica sylvestris*), meadowsweet and hedge bindweed (*Calystegia sepium*).

5. Woodlands of pedunculate oak, ash and sometimes alder, subject to periods of flooding of variable length on lowland rivers. The soils are well-drained to wet. These

woodlands are much closer in appearance and character to the mixed ash-oak high forests of non-alluvial sites. They are dominated by tall (20m +) oak and ash with a shrub layer of hazel, hawthorn, holly (*Ilex aquifolium*) and guelder rose (*Viburnum opulus*). The herb layer contains ivy (*Hedera helix*), lady fern, sanicle (*Sanicula europaea*), primrose (*Primula vulgaris*), meadowsweet, wood speedwell (*Veronica montana*) and, in spring, wild garlic (*Allium ursinum*), celandine (*Ranunculus ficaria*), wood anemone (*Anemone nemorosa*) and bluebell (*Hyacinthoides non-scripta*).

Tionscadal Soláthair Uisce
Water Supply Project

Natura Impact Statement (NIS)

(Appendix J) Watercourse Crossings and Pathways to European Sites

Document no: 32105801/EIAR/NIS/Appendix J
Version: Final

December 2025

Uisce Éireann
Irish Water

Jacobs

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Table 1: Watercourses Crossed by the Proposed Project and Pathways to European Sites

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
PSNWBP001	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	2.64	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	—	No potential	No potential	—	—
PSNWBP002	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	2.64		—	No potential	No potential	—	—
PSNWBP003	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	2.74		—	No potential	No potential	—	—
PSNWBP004	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.20		—	No potential	No potential	No potential	—
PSNWBP005	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	2.47		—	No potential	No potential	—	—
PSNWBP006	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	2.44		—	No potential	No potential	—	—
PSNWBP007	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	2.31		—	No potential	No potential	—	—
PSNWBP008	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.18		—	No potential	No potential	—	—
PSNWBP009	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.16		—	No potential	No potential	No potential	—
PSNWBP010	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.19		—	No potential	No potential	—	—
PSNWBP011	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.48		—	No potential	No potential	No potential	No
PSNWBP012	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.48		—	No potential	No potential	No potential	—
PSNWBP013	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.73		—	No potential	No potential	No potential	—
PSNWBP014	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.61		—	No potential	No potential	No potential	—
PSNWBP015	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.28		—	No potential	No potential	No potential	—
PSNWBP016	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.27		—	No potential	No potential	No potential	—
PSNWBP017	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.26		—	No potential	No potential	No potential	—
PSNWBP018	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.25		—	No potential	No potential	No potential	—
PSNWBP019	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.21		—	No potential	No potential	No potential	—

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
PSNWBP020	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.23		—	No potential	No potential	No potential	—
PSNWBP023	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.02		—	No potential	No potential	—	—
PSNWBP024	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	2.14		—	No potential	No potential	No potential	—
PSNWBP025	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	1.63		—	No potential	No potential	—	—
PSNWBP026	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	1.20		—	No potential	No potential	No potential	—
PSNWBP027	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	1.20		—	No potential	No potential	—	—
PSNWBP028	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.81		—	No potential	No potential	—	—
PSNWBP029	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.64		—	No potential	No potential	—	—
PSNWBP030	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.00		—	No potential	No potential	—	—
PSNWBP031	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.02		—	No potential	No potential	No potential	—
PSNWBP032	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.16		—	No potential	No potential	No potential	—
PSNWBP033	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.16		—	No potential	No potential	No potential	—
PSNWBP034	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.16		—	No potential	No potential	No potential	—
PSNWBP035	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.16		—	No potential	No potential	No potential	—
PSNWBP036	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.62		—	No potential	No potential	—	—
PSNWBP037	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.67		—	No potential	No potential	—	—
PSNWBP038	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.58		—	No potential	No potential	No potential	—
PSNWBP039	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.54		—	No potential	No potential	No potential	—
PSNWBP040	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.48		—	No potential	No potential	No potential	—
PSNWBP041	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.38		No potential. No suitable habitat	No potential	No potential	No potential	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
PSNWBP042	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.15		—	No potential	No potential	No potential	—
PSNWBP043	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.20		—	No potential	No potential	—	—
PSNWBP044	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.21		—	No potential	No potential	No potential	—
PSNWBP045	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.20		—	No potential	No potential	No potential	—
PSNWBP046	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.31		—	No potential	No potential	—	—
PSNWBP047	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.00		No potential. No suitable habitat	No potential	No potential	No potential	—
PSNWBP048	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.18		No potential. No suitable habitat	No potential	No potential	No potential	—
PSNWBP049	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	4.09		No potential. No suitable habitat	No potential	No potential	No potential	—
PSNWBP050	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.80		No potential. No suitable habitat	No potential	No potential	No potential	—
PSNWBP051	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	1.47		No potential. No suitable habitat	No potential	No potential	No potential	—
PSNWBP052	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	1.36		No potential. No suitable habitat	No potential	No potential	No potential	—
PSNWBP053	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	1.25		No potential. No suitable habitat	No potential	No potential	No potential	—
PSNWBP054	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	1.25		No potential. No suitable habitat	No potential	No potential	No potential	—
PSNWBP055	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.98		No potential. No suitable habitat	No potential	No potential	No potential	—
PSNWBP056	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.21		No potential. No suitable habitat	No potential	No potential	No potential	—
PSNWBP057	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.17		No potential. No suitable habitat	No potential	No potential	No potential	—
PSNWBP058	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.52		No potential. No suitable habitat	No potential	No potential	No potential	—
PSNWBP059	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.38		No potential. No suitable habitat	No potential	No potential	No potential	—
PSNWBP060	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.44		No potential. No suitable habitat	No potential	No potential	No potential	—
PSNWBP061	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	1.77		No potential. No suitable habitat	No potential	No potential	No potential	—

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
PSNWBP062	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.41		No potential. No suitable habitat	No potential	No potential	No potential	—
PSNWBP063	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	2.91		No potential. No suitable habitat	No potential	No potential	No potential	—
PSNWBP064	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.73		No potential. No suitable habitat	No potential	No potential	No potential	—
PSNWBP065	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.90		—	No potential	No potential	No potential	—
PSNWBP066	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.82		—	No potential	No potential	No potential	—
PSNWBP067	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.80		—	No potential	No potential	No potential	—
PSNWBP068	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	2.97		—	No potential	No potential	No potential	—
PSNWBP069	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.08		—	No potential	No potential	No potential	—
PSNWBP070	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	2.44		—	No potential	No potential	No potential	—
PSNWBX001	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	2.87		—	—	—	—	—
PSNWBX002	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	2.70		—	No potential	No potential	No potential	—
PSNWBX003	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	1.26		—	No potential	No potential	No potential	—
PSNWBX004	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.35		—	No potential	No potential	No potential	—
PSNWBX005	CANAL	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.06		—	Potential	Potential	Potential	Potential
PSNWBX006	UNNAMED TRIBUTARY	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.59		—	No potential	No potential	—	—
PSNWBX007	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.59		—	No potential	No potential	Potential	Potential
PSNWBX008	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.87		—	—	—	—	—
PSNWBX009	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	1.10		—	—	—	—	—
PSNWBX010	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	1.34		Good	Potential	Potential	Potential	Potential
PSNWCX001	BLACKWATER (CLARE)_020 (IE_SH_25B060250)	Good	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	2.77		Good	Potential	Potential	Potential	Potential

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
PSNWCX002	BLACKWATER (CLARE)_020 (IE_SH_25B060 250)	Good	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.75		Moderate potential	Salmonids recorded. High potential.	High potential	—	Otter prints recorded.
PSNWCX003	BLACKWATER (CLARE)_020 (IE_SH_25B060 250)	Good	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.14		Limited	Trout potential	Potential	No potential	No potential
PSNWCX004	SHANNON (LOWER)_050 (IE_SH_25S012 500)	Poor	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.00		—	Potential	No potential	Potential	Potential
PSNWCX005	SHANNON (LOWER)_050 (IE_SH_25S012 500)	Poor	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.17		—	No potential	No potential	—	—
PSNWCX006	SHANNON (LOWER)_050 (IE_SH_25S012 500)	Poor	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.15		—	No potential	No potential	No potential	No potential
WBP001	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.49		No potential. No suitable habitat.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP003	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.24		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP004	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.58		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP005	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	5.60		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP006	DRAIN	—	Yes (Sharavogue Bog SAC)	4.47	Yes Habitats including: Active raised bogs, Degraded raised bogs still capable of natural regeneration, and Depressions on peat substrates of the *Rhynchosporion*	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP009	DRAIN	—	Yes (Sharavogue Bog SAC)	2.45		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP010	DRAIN	—	Yes (Sharavogue Bog SAC)	2.90		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP011	DRAIN	—	Yes (Sharavogue Bog SAC)	2.94		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP012	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	7.33	Yes Wetland and Waterbirds including: Whooper Swan, Wigeon, Teal, Pintail, Shoveler, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and Greenland White-fronted Goose.	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP013	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	7.81		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP014	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	9.46		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP016	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	13.70	Yes Habitats including: Alluvial forests and Alkaline fens. Species including: Otter and Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and wetland and waterbirds	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP017	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	14.13		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP018	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	14.21		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP019	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	14.36		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP020	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	14.55		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP021	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	14.23		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
WBP022	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	8.98		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP023	DRAIN	—	Yes (Charleville Wood SAC)	6.09	Yes Habitats including: Alluvial forests Species including: Desmoulin's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP024	DRAIN	—	Yes (Charleville Wood SAC)	7.51		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP025	DRAIN	—	Yes (Charleville Wood SAC)	7.56		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP026	DRAIN	—	Yes (River Barrow and River Nore SAC)	11.89	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP027	DRAIN	—	Yes (River Barrow and River Nore SAC)	13.43		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP028	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.20		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP029	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.20		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP030	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.53		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP031	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.52		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP032	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.60		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP033	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.61		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP034	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.77		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP035	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.96		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP036	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.90		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP037	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.56		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP039	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	13.73	Yes Habitats including: Alkaline fens and Alluvial forests Species including: River Lamprey, Salmon, Otter, and Kingfisher	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP040	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	14.43		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP041	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	15.06		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP042	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	15.46		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP043	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	14.54		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP044	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	13.62		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP045	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	13.15		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP046	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	10.62	Yes Habitats including: Petrifying springs with tufa formation	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP047	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	10.09		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
WBP048	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	9.99	Species including: Narrow-mouthed Whorl Snail and Desmoulin's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP050	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	8.38		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP051	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	8.26		Potential spawning habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP052	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.11		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP055	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP056	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP057	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP058	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.15	Yes Habitats including: Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP059	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	6.31		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP061	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	11.75	Yes Habitats including: Alluvial forests and Alkaline fens. Species including: Otter and Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and wetland and waterbirds	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP062	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.13	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP063	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.84		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP066	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	2.33		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP068	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	2.67		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP069	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	5.18		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP070	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	5.47		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP071	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	5.74		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP072	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	6.40		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP073	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	7.55		—	—	—	—	—
WBP074	DRAIN	—	Yes (Lough Derg (Shannon) SPA)	4.85	Yes Wetland and Waterbirds including: Tufted Duck, Goldeneye, Common Tern and Cormorant	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP075	DRAIN	—	Yes (Lough Derg (Shannon) SPA)	4.31		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
WBP076	DRAIN	—	Yes (Lough Derg (Shannon) SPA)	3.41		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP077	DRAIN	—	Yes (Lough Derg (Shannon) SPA)	3.48		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP078	DRAIN	—	Yes (Lough Derg (Shannon) SPA)	3.43		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP079	DRAIN	—	Yes (Lough Derg (Shannon) SPA)	3.60		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP080	DRAIN	—	Yes (Lisduff Fen SAC)	2.48	Yes Habitats including: Petrifying springs with tufa formation and Alkaline fens. Species including: Geyer's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP081	DRAIN	—	Yes (Dovegrove Callows SPA)	9.22	Yes Wetland and Waterbirds including: Whooper Swan, Wigeon ,Teal, Pintail, Shoveler, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and Greenland White-fronted Goose.	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP082	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	9.57		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP083	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	9.57		—	—	—	—	—
WBP084	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	12.98	Yes Habitats including: Alluvial forests and Alkaline fens. Species including: Otter and Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and wetland and waterbirds	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP085	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	11.29		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP087	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	7.99		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP089	DRAIN	—	Yes (Charleville Wood SAC)	3.38	Yes Habitats including: Alluvial forests Species including: Desmoulin's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP090	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.19	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP091	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.04		No potential. No suitable habitat	2019: None observed. No spawning potential — peat and sand substrate and instream vegetation.	2019: None observed. No spawning potential — peat and sand substrate and instream vegetation.	2019: None observed. No suitable habitat. Acidic water and peat substrate.	None recorded. No potential.
WBP092	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.80		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP093	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.50		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP094	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.86		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP095	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.84		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP096	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.75		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP097	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.27		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP098	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.21		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP099	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.30		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP100	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.21		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
WBP101	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.55		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP102	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	10.20	Yes Habitats including: Petrifying springs with tufa formation Species including: Narrow-mouthed Whorl Snail and Desmoulin's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP103	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.21		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP104	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP106	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	13.82	Yes Habitats including: Alluvial forests Species including: Otter and Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and wetland and waterbirds	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP107	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	6.17	Yes Habitats including: Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter	—	—	—	—	—
WBP108	DRAIN	—	Yes (Lough Derg (Shannon) SPA)	4.47	Yes Wetland and Waterbirds including: Tufted Duck, Goldeneye, Common Tern and Cormorant	—	—	—	—	—
WBP109	DRAIN	—	Yes (Lisduff Fen SAC)	1.87	Yes Habitats including: Petrifying springs with tufa formation and Alkaline fens. Species including: Geyer's Whorl Snail	—	—	—	—	—
WBP110	DRAIN	—	Yes (Lisduff Fen SAC)	0.68		—	—	—	—	—
WBP111	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	12.60	Yes Habitats including: Alluvial forests Species including: Otter and Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and wetland and waterbirds	—	—	—	—	—
WBP112	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	13.78		—	—	—	—	—
WBP113	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	13.69		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP115	DRAIN	—	Yes (Charleville Wood SAC)	5.75	Yes Habitats including: Alluvial forests Species including: Desmoulin's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP116	DRAIN	—	Yes (River Barrow and River Nore SAC)	12.98	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	—	—	—	—	—
WBP117	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.98		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP118	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.31		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP119	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP120	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
WBP121	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	15.41	Yes Habitats including: Alkaline fens and Alluvial forests Species including: River Lamprey, Salmon, Otter, and Kingfisher	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP122	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.36	Yes Habitats including: Petrifying springs with tufa formation Species including: Narrow-mouthed Whorl Snail and Desmoulin's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP123	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	12.97	Yes Habitats including: Alluvial forests and Alkaline fens. Species including: Otter and Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and wetland and waterbirds	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP124	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	12.83		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP125	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	11.63		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP126	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	7.66	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP128	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	9.83	Yes Habitats including: Alluvial forests and Alkaline fens. Species including: Otter and Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and wetland and waterbirds	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP129	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	9.74		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP130	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	9.54		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP131	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	9.12		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP132	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	8.76		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP133	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	8.65		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP134	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	8.35		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP136	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	8.18		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP137	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	7.85		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP139	DRAIN	—	Yes (Charleville Wood SAC)	5.73	Yes Habitats including: Alluvial forests Species including: Desmoulin's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP140	DRAIN	—	Yes (Charleville Wood SAC)	5.64		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP142	DRAIN	—	Yes (Charleville Wood SAC)	5.34		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP143	DRAIN	—	Yes (Charleville Wood SAC)	4.13		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
WBP145	DRAIN	—	Yes (Charleville Wood SAC)	4.07		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP146	DRAIN	—	Yes (Charleville Wood SAC)	3.54		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP147	DRAIN	—	Yes (Charleville Wood SAC)	5.78		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP148	DRAIN	—	Yes (Charleville Wood SAC)	6.19		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP150	DRAIN	—	Yes (Charleville Wood SAC)	7.65		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP151	DRAIN	—	Yes (Charleville Wood SAC)	8.32		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP152	DRAIN	—	Yes (Charleville Wood SAC)	8.49		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP153	DRAIN	—	Yes (Charleville Wood SAC)	9.99		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP154	DRAIN	—	Yes (Charleville Wood SAC)	10.86		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP155	DRAIN	—	Yes (Charleville Wood SAC)	11.19		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP156	DRAIN	—	Yes (River Barrow and River Nore SAC)	11.99	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP157	DRAIN	—	Yes (River Barrow and River Nore SAC)	12.25		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP158	DRAIN	—	Yes (River Barrow and River Nore SAC)	12.56		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP159	DRAIN	—	Yes (River Barrow and River Nore SAC)	13.01		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP160	DRAIN	—	Yes (River Barrow and River Nore SAC)	12.95		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP161	DRAIN	—	Yes (River Barrow and River Nore SAC)	13.00		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP162	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.21		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP163	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.19		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP164	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.26		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP165	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.08		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP166	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.96		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP167	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.02		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP168	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.91		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP169	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.94		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP170	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.28		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP172	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.38		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP173	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.36		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP174	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.36		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP175	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.72	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
					Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler					
WBP176	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.77	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP177	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.67		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP178	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.56		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP179	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.48		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP180	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.49		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP182	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	13.72	Yes Habitats including: Alkaline fens and Alluvial forests Species including: River Lamprey, Salmon, Otter, and Kingfisher	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP183	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	12.69		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP184	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	12.15	Yes Habitats including: Petrifying springs with tufa formation Species including: Narrow-mouthed Whorl Snail and Desmoulin's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP185	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	11.58		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP186	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	9.49		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP187	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	9.49		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP188	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	9.15		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP189	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	9.12		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP190	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	9.01		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP191	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	8.82		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP192	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	8.73		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP193	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	8.47		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP194	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.83		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP195	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.87		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP196	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.50		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP197	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.50		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP198	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.38		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP199	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.23		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP200	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.22		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
WBP201	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.13		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP202	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.09		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP203	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP205	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP206	DRAIN	—	Yes (Lough Derg, North-east Shore SAC & Lough Derg (Shannon) SPA)	11.00	Yes Habitats including: Alluvial forests and Alkaline fens Species including: Cormorant, Tufted duck, Golden Eye, Common Tern and Wetlands and Waterbirds	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP207	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP208	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP209	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP210	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	9.57	Yes Wetland and Waterbirds including: Whooper Swan, Wigeon, Teal, Pintail, Shoveler, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and Greenland White-fronted Goose.	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP211	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP212	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP213	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP214	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP215	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP216	NA	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP217	NA	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP218	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP219	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP220	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.72	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP221	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.09		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP222	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	2.14		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP223	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.56		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP224	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.52		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
WBP225	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	7.40	Yes Wetland and Waterbirds including: Whooper Swan, Wigeon, Teal, Pintail, Shoveler, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and Greenland White-fronted Goose.	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP226	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.30	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP227	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.18		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP228	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.51		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP229	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	5.60		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP230	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	5.92		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP231	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	5.97		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP232	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	7.67		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP233	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	7.73		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP234	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	7.73		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP235	DRAIN	—	Lough Derg (Shannon) SPA	5.77	Yes Wetland and Waterbirds including: Tufted Duck, Goldeneye, Common Tern and Cormorant	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP236	DRAIN	—	Lough Derg (Shannon) SPA	5.42		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP239	DRAIN	—	Lough Derg (Shannon) SPA	5.27		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP240	DRAIN	—	Lough Derg (Shannon) SPA	5.23		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP241	DRAIN	—	Lough Derg (Shannon) SPA	4.50		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP242	DRAIN	—	Lough Derg (Shannon) SPA	3.46		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP243	DRAIN	—	Lough Derg (Shannon) SPA	3.38		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP244	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	15.06	Yes Habitats including: Alkaline fens and Alluvial forests Species including: River Lamprey, Salmon, Otter, and Kingfisher	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP245	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	15.33		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP246	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	14.22		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP247	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	13.77		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
WBP248	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	13.44		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP249	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.23	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP250	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.78		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP251	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	7.03	Yes Wetland and Waterbirds including: Whooper Swan, Wigeon, Teal, Pintail, Shoveler, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and Greenland White-fronted Goose.	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP252	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.36	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP253	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.71		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP254	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP255	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP256	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	9.57	Yes Wetland and Waterbirds including: Whooper Swan, Wigeon, Teal, Pintail, Shoveler, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and Greenland White-fronted Goose.	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP257	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	9.56		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP258	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	9.54		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP259	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	9.61		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP260	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	9.95		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP261	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	14.55	Yes Habitats including: Alluvial forests and Alkaline fens. Species including: Otter and Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and wetland and waterbirds	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP262	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	14.54		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP263	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	14.28		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP264	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.59	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP265	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.60		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
					Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler					
WBP266	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	9.61	Yes Wetland and Waterbirds including: Whooper Swan, Wigeon, Teal, Pintail, Shoveler, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and Greenland White-fronted Goose.	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP267	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	7.42		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP268	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP269	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	9.52	Yes Wetland and Waterbirds including: Whooper Swan, Wigeon, Teal, Pintail, Shoveler, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and Greenland White-fronted Goose.	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP271	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	11.81	Habitats including: Petrifying springs with tufa formation Species including: Narrow-mouthed Whorl Snail and Desmoulin's Whorl Snail	—	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP272	DRAIN	—	Lough Derg (Shannon) SPA	5.18	Yes Wetland and Waterbirds including: Tufted Duck, Goldeneye, Common Tern and Cormorant	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP273	DRAIN	—	Lough Derg (Shannon) SPA	3.98		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP274	DRAIN	—	Lough Derg (Shannon) SPA	6.17		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP275	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	13.95	Yes Habitats including: Alluvial forests and Alkaline fens. Species including: Otter and Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and wetland and waterbirds	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP276	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	14.07		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP277	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	14.30		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP278	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	7.69	Yes Wetland and Waterbirds including: Whooper Swan, Wigeon, Teal, Pintail, Shoveler, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and Greenland White-fronted Goose.	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP279	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	10.88	Habitats including: Petrifying springs with tufa formation Species including: Narrow-mouthed Whorl Snail and Desmoulin's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP280	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	13.53	Yes Habitats including: Alkaline fens and Alluvial forests Species including: River Lamprey, Salmon, Otter, and Kingfisher	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP281	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	7.81	Yes Wetland and Waterbirds including: Whooper Swan, Wigeon, Teal, Pintail, Shoveler, Golden Plover, Lapwing, Black-tailed Godwit, Black-	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
					headed Gull and Greenland White-fronted Goose.					
WBP282	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.59	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP283	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	8.28	Yes Wetland and Waterbirds including: Whooper Swan, Wigeon, Teal, Pintail, Shoveler, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and Greenland White-fronted Goose.	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP284	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	7.81	Yes Wetland and Waterbirds including: Whooper Swan, Wigeon ,Teal, Pintail, Shoveler, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and Greenland White-fronted Goose.	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP285	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	11.93	Habitats including: Petrifying springs with tufa formation Species including: Narrow-mouthed Whorl Snail and Desmoulin's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP286	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	7.92	Yes Wetland and Waterbirds including: Whooper Swan, Wigeon ,Teal, Pintail, Shoveler, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and Greenland White-fronted Goose.	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP287	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	7.31	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP288	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	7.32		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP289	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	6.98		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP290	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	7.14		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP291	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	6.70		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP292	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	13.88	Yes Habitats including: Alkaline fens and Alluvial forests Species including: River Lamprey, Salmon, Otter, and Kingfisher	—	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP293	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	16.82		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
WBP294	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.35	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP296	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	13.44	Yes Habitats including: Alkaline fens and Alluvial forests Species including: River Lamprey, Salmon, Otter, and Kingfisher	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP297	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	13.45		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP298	DRAIN	—	Yes (Charleville Wood SAC)	4.05	Yes Habitats including: Alluvial forests Species including: Desmoulin's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP299	DRAIN	—	Yes (River Barrow and River Nore SAC)	13.17	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP300	DRAIN	—	Yes (River Barrow and River Nore SAC)	13.19		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP301	DRAIN	—	Yes (River Barrow and River Nore SAC)	13.13		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP302	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.53		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP303	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.47		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP304	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.68		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP305	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.77		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP306	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.67		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP307	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP308	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.31	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP309	CLODIAGH (TULLAMORE)_030 (IE_SH_25C060340)	—	Yes (Charleville Wood SAC)	3.20	Yes Habitats including: Alluvial forests Species including: Desmoulin's Whorl Snail	Low to Moderate potential. Trout potential	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP310	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.16	Habitats including: Petrifying springs with tufa formation	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP311	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.39		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
					Species including: Narrow-mouthed Whorl Snail and Desmoulin's Whorl Snail					
WBP312	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.61	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP314	DRAIN	—	Yes (Charleville Wood SAC)	3.38	Yes Habitats including: Alluvial forests Species including: Desmoulin's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP316	DRAIN	—	Yes (River Barrow and River Nore SAC)	16.53	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP317	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	13.83	Yes Habitats including: Alkaline fens and Alluvial forests Species including: River Lamprey, Salmon, Otter, and Kingfisher	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP318	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	7.49	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP319	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	7.36	Yes Wetland and Waterbirds including: Whooper Swan, Wigeon, Teal, Pintail, Shoveler, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and Greenland White-fronted Goose.	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP320	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.56	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
WBP321	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.69	Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP322	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.66		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP323	DRAIN	—	Lough Derg (Shannon) SPA	3.66	Yes Wetland and Waterbirds including: Tufted Duck, Goldeneye, Common Tern and Cormorant	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP324	DRAIN	—	Lough Derg (Shannon) SPA	3.67		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP325	DRAIN	—	Lough Derg (Shannon) SPA	3.63		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP326	DRAIN	—	Yes (SAC: 002162)	14.22	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP327	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.19		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP328	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	6.87	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	—	None recorded. No potential.	None recorded. No potential.	—	—
WBP329	DRAIN	—	Lough Derg (Shannon) SPA	3.44	Yes Wetland and Waterbirds including: Tufted Duck, Goldeneye, Common Tern and Cormorant	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP330	DRAIN	—	Lough Derg (Shannon) SPA	4.59		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP331	DRAIN	—	Lough Derg (Shannon) SPA	4.94		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP332	DRAIN	—	Yes (Lough Derg, North-east Shore SAC & Lough Derg (Shannon) SPA)	11.00	Yes Habitats including: Alluvial forests and Alkaline fens Species including: Cormorant, Tufted duck, Golden Eye, Common Tern and Wetlands and Waterbirds	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP333	DRAIN	—	Yes (Lough Derg, North-east Shore SAC & Lough Derg (Shannon) SPA)	11.00		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP334	DRAIN	—	Yes (Sharavogue Bog SAC)	3.22	Yes Habitats including: Active raised bogs, Degraded raised bogs still capable of natural regeneration, and Depressions on peat substrates of the *Rhynchosporion*	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP335	DRAIN	—	Yes (Sharavogue Bog SAC)	2.91		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP336	DRAIN	—	Yes (Sharavogue Bog SAC)	1.66		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
WBP337	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	14.36	Yes Habitats including: Alluvial forests and Alkaline fens. Species including: Otter and Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and wetland and waterbirds	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP338	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	12.20		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP339	DRAIN	—	Yes (Charleville Wood SAC)	4.96	Yes Habitats including: Alluvial forests Species including: Desmoulin's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP340	DRAIN	—	Yes (Charleville Wood SAC)	3.93		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP341	DRAIN	—	Yes (Charleville Wood SAC)	7.23		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP342	DRAIN	—	Yes (River Barrow and River Nore SAC)	12.95	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP343	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.22		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP344	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.22		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP345	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.19		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP346	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.88		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP347	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.05		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP348	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.35		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP349	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.98		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP350	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.67		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP351	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.45		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP352	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.33		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP353	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.32		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP354	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.21		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP355	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.96		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP356	DRAIN	—	Yes (River Barrow and River Nore SAC)	16.88		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP357	DRAIN	—	Yes (River Barrow and River Nore SAC)	16.22		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP359	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.24		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP360	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	13.10	Yes Habitats including: Alkaline fens and Alluvial forests Species including: River Lamprey, Salmon, Otter, and Kingfisher	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP361	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	14.38		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP362	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	15.13		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP363	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.32	Habitats including: Petrifying springs with tufa formation	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
WBP364	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.32	Species including: Narrow-mouthed Whorl Snail and Desmoulin's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP365	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.65	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP366	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.39	Habitats including: Petrifying springs with tufa formation Species including: Narrow-mouthed Whorl Snail and Desmoulin's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP367	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP368	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP369	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.28	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	—	—	—	—	—
WBP373	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	8.16	Yes Habitats including: Alluvial forests and Alkaline fens. Species including: Otter and Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and wetland and waterbirds	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP374	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	8.14		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP375	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	8.18		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP376	DRAIN	—	Yes (Charleville Wood SAC)	5.02	Yes Habitats including: Alluvial forests Species including: Desmoulin's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP377	DRAIN	—	Yes (Charleville Wood SAC)	5.05		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP378	DRAIN	—	Yes (River Barrow and River Nore SAC)	13.21	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP380	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.28		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP382	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.12		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP385	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.91		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP386	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.94		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP387	DRAIN	—	Yes (River Barrow and River Nore SAC)	14.81		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
WBP388	DRAIN	—	Yes (River Barrow and River Nore SAC)	16.10		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP389	DRAIN	—	Yes (River Barrow and River Nore SAC)	12.43		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP390	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	6.49	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP391	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.30	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP392	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	14.45	Yes Habitats including: Alkaline fens and Alluvial forests Species including: River Lamprey, Salmon, Otter, and Kingfisher	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP393	DRAIN	—	Yes (River Barrow and River Nore SAC)	13.10	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP394	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.14	Habitats including: Petrifying springs with tufa formation Species including: Narrow-mouthed Whorl Snail and Desmoulin's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP395	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.13		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBP396	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.28	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew,	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
					Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler					
WBP397	DRAIN	—	Yes (Lough Derg, North-east Shore SAC & Lough Derg (Shannon) SPA)	11.70	Yes Habitats including: Alluvial forests and Alkaline fens Species including: Cormorant, Tufted duck, Golden Eye, Common Tern and Wetlands and Waterbirds	—	None recorded. No potential.	None recorded. No potential.	—	—
WBP398	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	17.58	Yes Habitats including: Alluvial forests with Alnus glutinosa and Fraxinus excelsior (*Alno—Padion, Alnion incanae, Salicion albae*), and Alkaline Fens Species including: Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black—tailed Godwit, Black—headed Gull, Wetland and Waterbirds and Otter	—	No potential	No potential	No potential	—
WBP399	DRAIN	—	Yes (Dovegrove Callows SPA)	7.27	Yes Species including: Greenland White—fronted Goose	—	No potential	No potential	No potential	—
WBP400	DRAIN	—	Yes (Dovegrove Callows SPA)	7.51	Yes Species including: Greenland White—fronted Goose	—	No potential	No potential	No potential	—
WBP401	DRAIN	—	Yes (Lough Derg (Shannon) SPA)	5.70	Yes Species including: Cormorant, Tufted Duck, Goldeneye, Common Tern and Wetland and Waterbirds	—	No potential	No potential	No potential	—
WBP402	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	1.02	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	—	No potential	No potential	No potential	—
WBP403	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.25	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover,	—	No potential	No potential	No potential	—

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
					Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler					
WBP404	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	17.55	Yes Habitats including: Alluvial forests with Alnus glutinosa and Fraxinus excelsior (*Alno—Padion, Alnion incanae, Salicion albae*), and Alkaline Fens Species including: Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black—tailed Godwit, Black—headed Gull, Wetland and Waterbirds and Otter	—	No potential	No potential	No potential	—
WBP405	DRAIN	—	Yes (Dovegrove Callows SPA)	7.72	Yes Habitats including: Petrifying springs with tufa formation (Cratoneurion) Species including: Narrow—mouthed Whorl Snail and Desmoulin's Whorl Snail	—	No potential	No potential	No potential	—
WBP406	DRAIN	—	Yes (Charleville Wood SAC)	5.88	Yes Habitats including: Alluvial forests with Alnus glutinosa and Fraxinus excelsior (*Alno—Padion, Alnion incanae, Salicion albae*) Species including: Desmoulin's Whorl Snail	—	No potential	No potential	No potential	—
WBX001	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.26	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	Good. Lamprey potential	None recorded. No potential.	River/brook lamprey recorded in 2021 Lamprey potential	None recorded. No potential.	None recorded. No potential.
WBX002	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.27		Good. Lamprey potential	None recorded. No potential.	River/brook lamprey recorded. Lamprey potential	None recorded. No potential.	None recorded. No potential.
WBX003	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.61		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX004	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.44		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX005	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	2.77		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX006	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	2.82		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX007	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	2.96		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX008	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.42		Low to Moderate potential. Trout potential	None recorded. Potential	No potential	No potential	None recorded.

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							Salmonid	Lamprey	Crayfish	Otter
										Foraging potential
WBX009	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.62		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX010	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.59		Low to Moderate potential	None recorded. Low to moderate potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX011	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.51		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX012	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.26		Low potential. Suitable substrate for salmonids but all riffle habitat with no spawning pools. Not suitable for lamprey spawning although may migrate along channel. No crayfish potential.	None recorded. No potential	None recorded. No potential	None recorded. No potential	None recorded. No potential
WBX013	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	6.49		No potential — No gravel present with little flow.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX014	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	7.43		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX015	DRAIN	—	Yes (Lough Derg (Shannon) SPA)	4.59	Yes Wetland and Waterbirds including: Tufted Duck, Goldeneye, Common Tern and Cormorant	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX016	DRAIN	—	Yes (Lough Derg (Shannon) SPA)	3.80		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX017	DRAIN	—	Yes (Lough Derg (Shannon) SPA)	3.92		No potential. No suitable habitat	None recorded. No potential.	None recorded. Limited potential.	None recorded. No potential.	None recorded. No potential.
WBX018	DRAIN	—	Yes (Lough Derg (Shannon) SPA)	4.59		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX019	DRAIN	—	Yes (Lough Derg, North-east Shore SAC & Lough Derg (Shannon) SPA)	8.31	Yes Habitats including: Alluvial forests and Alkaline fens Species including: Cormorant, Tufted duck, Golden Eye, Common Tern and Wetlands and Waterbirds	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX020	DRAIN	—	Yes (Lough Derg, North-east Shore SAC & Lough Derg (Shannon) SPA)	10.72		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX021	DRAIN	—	Yes (Sharavogue Bog SAC)	3.93	Yes Habitats including: Active raised bogs, Degraded raised bogs still capable of natural regeneration, and Depressions on peat substrates of the *Rhynchosporion*	No potential. No suitable habitat. Insufficient depth. No riffle of pool habitat and quite a lot of silt.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX022	DRAIN	—	Yes (Sharavogue Bog SAC)	3.02		No potential. No flow and heavy silt with excessive macrophyte growth.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX023	DRAIN	—	Yes (Sharavogue Bog SAC)	1.66		No potential. No suitable habitat due to heavy vegetation	None recorded. No potential.	None recorded. Limited potential.	None recorded. No potential.	None recorded. No potential.
WBX024	DRAIN	—	Yes (Sharavogue Bog SAC)	1.43		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
WBX025	DRAIN	—	Yes (Sharavogue Bog SAC)	1.86		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX026	DRAIN	—	Yes (Sharavogue Bog SAC)	2.76		No potential. No suitable habitat	None recorded. No potential.	None recorded. Low - moderate potential.	None recorded. No potential.	None recorded. No potential.
WBX027	DRAIN	—	Yes (Sharavogue Bog SAC)	2.75		Low to Moderate potential. Some suitable gravels present	2019: None recorded2018: B.Trout recorded	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WBX028	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	7.70	Yes Wetland and Waterbirds including: Whooper Swan, Wigeon, Teal, Pintail, Shoveler, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and Greenland White-fronted Goose.	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX029	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	7.60		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX030	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	7.13		Possible spawning habitat.	None recorded. Moderate potential.	Possible spawning habitat.	None recorded. Moderate potential.	None recorded. Otter potential.
WBX031	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	7.05		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX032	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	6.99		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX033	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	7.08		No potential. No suitable habitat	None recorded. No potential.	None recorded. Low potential.	None recorded. No potential.	None recorded. No potential.
WBX034	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	9.48		Good. Potential downstream with suitable gravels and silt	2017: Brown trout present	Limited potential2020: Positive scoop test for lamprey: 7 juvenile river/brook in three scoops.	None recorded. No potential	2019: Potential slides
WBX035	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	9.63		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX036	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	9.62		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX037	DRAIN	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	9.60		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential	None recorded. No potential	2016: Otter signs (tracks and scat) approximately 5m outside Wayleave along bank. 2018: Otter tracks within Wayleave.
WBX038	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	12.48	Yes Habitats including: Alluvial forests and Alkaline fens. Species including: Otter and Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and wetland and waterbirds	—	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WBX039	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	12.74		Low potential. Lack of gravel/cover and appropriate flow	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX040	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	12.72		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX041	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	12.31		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX042	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	11.91		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX043	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	11.26		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX045	DRAIN	—	Yes (Charleville Wood SAC)	5.36	Yes	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

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							Salmonid	Lamprey	Crayfish	Otter
WBX046	DRAIN	—	Yes (Charleville Wood SAC)	5.63	Habitats including: Alluvial forests Species including: Desmoulin's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX047	DRAIN	—	Yes (Charleville Wood SAC)	5.04		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX048	DRAIN	—	Yes (Charleville Wood SAC)	4.86		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX049	DRAIN	—	Yes (Charleville Wood SAC)	4.44		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX050	DRAIN	—	Yes (Charleville Wood SAC)	4.28		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX051	DRAIN	—	Yes (Charleville Wood SAC)	4.07		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX052	DRAIN	—	Yes (Charleville Wood SAC)	3.93		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX053	DRAIN	—	Yes (Charleville Wood SAC)	3.30		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX054	DRAIN	—	Yes (Charleville Wood SAC)	4.83		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX055	DRAIN	—	Yes (Charleville Wood SAC)	5.19		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX056	DRAIN	—	Yes (Charleville Wood SAC)	5.73		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX057	DRAIN	—	Yes (Charleville Wood SAC)	7.39		Low potential	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WBX058	DRAIN	—	Yes (Charleville Wood SAC)	10.10		Low potential	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WBX059	DRAIN	—	Yes (Charleville Wood SAC)	10.32		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX060	DRAIN	—	Yes (Charleville Wood SAC)	10.33		Low potential	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded.
WBX061	DRAIN	—	Yes (Charleville Wood SAC)	10.42		Low potential	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded.
WBX062	DRAIN	—	Yes (Charleville Wood SAC)	11.09		Low potential	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WBX063	DRAIN	—	Yes (River Barrow and River Nore SAC)	11.78	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX064	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.02		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX066	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.21		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX067	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.13		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX068	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.43		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	2019: Prints and potentially used entrance through hedgerow to watercourse
WBX069	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.71		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX071	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.66		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX072	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.62		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX073	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.88		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX074	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.90		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX075	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.72		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

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							Salmonid	Lamprey	Crayfish	Otter
WBX076	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.82		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX077	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.73		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX078	CANAL	—	Yes (River Barrow and River Nore SAC)	15.90		No potential. No suitable gravels and low flow. Substrate heavily vegetated and silty. No suitable habitat for juvenile lamprey.	None recorded. Salmonid potential.	None recorded. No potential.	None recorded. No potential — likely too acidic	2019: Slide
WBX079	DRAIN	—	Yes (River Barrow and River Nore SAC)	15.29		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX080	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	15.01	Yes Habitats including: Alkaline fens and Alluvial forests Species including: River Lamprey, Salmon, Otter, and Kingfisher	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX081	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	13.60		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX082	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	11.30	Habitats including: Petrifying springs with tufa formation Species including: Narrow-mouthed Whorl Snail and Desmoulin's Whorl Snail	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX083	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	10.77		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX084	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.31		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX085	DRAIN	—	Yes (Rye Water Valley/Carton SAC)	7.33		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX086	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX087	DRAIN	—	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX088	CANAL	—	No	—	—	No potential. No spawning gravels, organic substrate and lots of instream vegetation. No riffle habitats. Not suitable for juvenile lamprey.	None recorded. No potential.	None recorded. Low potential.	None recorded. Low potential — instream vegetation with low flow. No overhanging vegetation.	2019: Otter slide and potential otter slide
WBX090	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.67	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX091	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.67		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX092	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	9.57	Yes Habitats including: Alluvial forests and Alkaline fens. Species including: Otter and Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing,	No potential. No suitable habitat	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Otter potential.
WBX093	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	8.49		No potential. No suitable habitat	None recorded. No potential.	None recorded. Low potential	None recorded. No potential	None recorded. Low potential.

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							Salmonid	Lamprey	Crayfish	Otter
					Black-tailed Godwit, Black-headed Gull and wetland and waterbirds					
WBX094	DRAIN	—	Yes (Charleville Wood SAC)	5.70	Yes Habitats including: Alluvial forests Species including: Desmoulin's Whorl Snail	Low potential	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WBX095	DRAIN	—	Yes (Charleville Wood SAC)	5.36		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX096	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.03	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX097	DRAIN	—	Yes (Charleville Wood SAC)	11.00	Yes Habitats including: Alluvial forests Species including: Desmoulin's Whorl Snail	Low potential	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WBX098	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	14.28	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX099	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	15.63		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX100	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	15.39		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX103	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	14.46		No potential – High TSS	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX104	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	16.11		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX105	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	17.08		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX106	DRAIN	—	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	13.31	Yes Habitats including: Alkaline fens and Alluvial forests Species including: River Lamprey, Salmon, Otter, and Kingfisher	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX107	DRAIN	—	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	12.62	Yes Habitats including: Alluvial forests and Alkaline fens. Species including: Otter and Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and wetland and waterbirds	—	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WBX108	DRAIN	—	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	3.53	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel,	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
					Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler					
WBX109	CANAL	—	Yes (River Barrow and River Nore SAC)	16.12	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Common Bottlenose Dolphin, Otter	No potential. No suitable habitat	None recorded. Low potential	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX110	NA	—	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	6.35	Yes Wetland and Waterbirds including: Whooper Swan, Wigeon ,Teal, Pintail, Shoveler, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and Greenland White-fronted Goose.	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX111	DRAIN	—	Yes (Dovegrove Callows SPA)	6.33	Yes Species including Greenland White-fronted Goose.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WBX112	DRAIN	—	Yes (Dovegrove Callows SPA)	7.84	Yes Species including Greenland White-fronted Goose.	None recorded. No potential.	None recorded. Potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WCX001	KILMASTULLA_050 (IE_SH_25K041000)	Moderate	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	Yes high. Good spawning and nursery habitat	Yes high. Good spawning and nursery habitat	Potential for crayfish and lamprey	Potential for crayfish and lamprey	Commuting, resting and forgaing otter habitat
WCX002	KILMASTULLA_050 (IE_SH_25K041000)	Moderate	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.33		Potential for spawning and nursery habitat	Potential for salmonids: potential but steeply sloping weir with apron at confluence of river downstream.	2024: Scoop test negative but good lamprey habitat 2022: Lamprey recorded— One positive lamprey scoop test, 11 lamprey, ammocetes and adults.	potential— Good refuge for crayfish but no instream veg or suitable bank for burrows	2024:Otter prints along bank
WCX003	KILMASTULLA_050 (IE_SH_25K041000)	Moderate	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0.80		Good	None recorded. Trout potential	None recorded. Lamprey potential.	None recorded. Crayfish potential.	None recorded. Otter potential.
WCX004	KILMASTULLA_050 (IE_SH_25K041000)	Moderate	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	1.30		Low to Moderate. Riffles, flow and glide present for Salmonids but weir (80cm high) prevents fish pass.	Moderate potential — weir (80cm high) prevents fish pass. 2018: Potential	2016: B.Lamprey u/s crossing 2019: Undercut banks with silty banks and	None recorded. Crayfish potential.	2016: Otter (glide and potential holt within Wayleave) 2019: Potential slides

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							Salmonid	Lamprey	Crayfish	Otter
							brown trout observed. 2019: None recorded. 2020: No due to weir downstream	pools suitable for lampreys 2020: None recorded		
WCX005	KILMASTULLA_030 (IE_SH_25K040800)	Poor	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	4.10		Moderate	2017: Trout recorded	2019: Undercut bank with nice glide suitable for lamprey. 2020: Suitable for brook lamprey downstream	None recorded. Crayfish potential. 2020: downstream not suitable for crayfish	None recorded. Otter potential.
WCX006	KILMASTULLA_020 (IE_SH_25K040300)	Moderate	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	4.73		Low to Moderate. Heavy siltation	None recorded. Salmonid potential.	None recorded. Lamprey potential — Undercut banks, silt banks suitable for lampreys.	None recorded. Crayfish potential.	None recorded. Otter potential.
WCX007	KILMASTULLA_020 (IE_SH_25K040300)	Moderate	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	5.06		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WCX008	KILMASTULLA_020 (IE_SH_25K040300)	Moderate	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	5.83		Low potential	None recorded. Low potential.	Moderate potential.	No Potential	None recorded. Otter potential.
WCX009	KILMASTULLA_020 (IE_SH_25K040300)	Moderate	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	6.10		No potential. No suitable habitat	None recorded. No potential.	None recorded. Low potential.	None recorded. No potential.	2019: Couch in gorse cover with slide into water
WCX010	KILMASTULLA_020 (IE_SH_25K040300)	Moderate	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	6.63		No potential. No suitable habitat	None recorded. No potential.	Scoop test positive for Lamprey ammoceotes. Potential	None recorded. No potential.	None recorded. No potential.
WCX011	ARDGREGANE STREAM_010 (IE_SH_25A040100)	Poor	Yes Lough Derg (Shannon) SPA	5.65	Yes Wetland and Waterbirds including: Tufted Duck, Goldeneye, Common Tern and Cormorant	No potential. Cattle access has fouled and silted water	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WCX012	ARDGREGANE STREAM_020 (IE_SH_25A040400)	Moderate	Yes Lough Derg (Shannon) SPA	4.89		Low potential	Potential Brown trout sighting.	No potential	No potential	No Potential
WCX013	ARDGREGANE STREAM_020 (IE_SH_25A040400)	Moderate	Yes Lough Derg (Shannon) SPA	4.02		Moderate. Good habitat for lamprey with lots of cover from vegetation, good flow and depth, silty banks for eggs.	2017: B.Trout recorded Good potential — Salmonids recorded (Ranked a Salmonid watercourse-based field data)	2017: B. lamprey recorded. Potential — Lamprey ammocoetes recorded (6 to 8cm)	2017: Crayfish recorded. Potential	Potential

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							Salmonid	Lamprey	Crayfish	Otter
WCX014	ARDGREGANE STREAM_020 (IE_SH_25A040 400)	Moderate	Yes Lough Derg (Shannon) SPA	3.71		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WCX015	NENAGH_070 (IE_SH_25N010 800)	Moderate	Yes Lough Derg (Shannon) SPA	3.37		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	2019: Habitat — good habitat found in riparian woodland/scrub. Adjacent to river and good area for foraging and nesting. Flooded at time of survey so no field signs recorded.
WCX016	NENAGH_070 (IE_SH_25N010 800)	Moderate	Yes Lough Derg (Shannon) SPA	4.15		Good	2016: B.Trout recorded Potential	None recorded. Potential	Potential	2016: Otter (spraint) at edge of Wayleave. 2018: Potential otter tracks approximately 30m U/S of Wayleave. High Potential
WCX017	NENAGH TRIBUTARY_01 0 (IE_SH_25N120 710)	Moderate	Yes Lough Derg (Shannon) SPA	4.68		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WCX018	ARDCRONY STREAM_010 (IE_SH_25A060 500)	Moderate	Yes (Lough Derg, North-east Shore SAC & Lough Derg (Shannon) SPA)	4.34	Yes Habitats including: Alluvial forests and Alkaline fens Species including: Cormorant, Tufted duck, Golden Eye, Common Tern and Wetlands and Waterbirds	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WCX019	ARDCRONY STREAM_010 (IE_SH_25A060 500)	Moderate	Yes (Lough Derg, North-east Shore SAC & Lough Derg (Shannon) SPA)	7.89		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WCX020	BALLYFINBOY_ 040 (IE_SH_25B020 550)	Moderate	Yes (Lough Derg, North-east Shore SAC & Lough Derg (Shannon) SPA)	11.26		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WCX021	BALLYFINBOY_ 040 (IE_SH_25B020 550)	Moderate	Yes (Lough Derg, North-east Shore SAC & Lough Derg (Shannon) SPA)	11.47		Good	2018: Potential brown trout observed. Potential	Lamprey ammocoetes recorded in 2024 Potential	None recorded. Crayfish potential.	None recorded. Otter potential.
WCX022	KILCOMIN STREAM_030 (IE_SH_25K150 085)	Moderate	Yes (Sharavogue Bog SAC)	3.69	Yes Habitats including: Active raised bogs, Degraded raised bogs still capable of natural regeneration, and Depressions on peat substrates of the *Rhynchosporion*	No potential. No suitable habitat	No potential	No potential	No potential	No potential
WCX023	KILCOMIN STREAM_030 (IE_SH_25K150 085)	Moderate	Yes (Sharavogue Bog SAC)	3.12		Low potential	Potential	Potential	No potential	No potential
WCX024	SHINRONE STREAM_010 (IE_SH_25S110 100)	Poor	Yes (Sharavogue Bog SAC)	1.62		No potential – dry channel during low flow periods.	No potential	No potential	No potential	No potential

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							Salmonid	Lamprey	Crayfish	Otter
WCX025	SHINRONE STREAM_010 (IE_SH_25S110 100)	Poor	Yes (Sharavogue Bog SAC)	1.18		Low potential. Good riffle habitat but too much silt to be deemed good potential for spawning. No undercut banks or sufficient depth in silt for lamprey.	Potential	No potential	No potential	No potential
WCX026	LITTLE BROSNA_030 (IE_SH_25L020 600)	Good	Yes (Sharavogue Bog SAC)	2.59		Moderate	Trout and coarse fish potential	Potential	Potential.	Good potential for otter
WCX027	ROCK (BIRR)_010 (IE_SH_25R020 050)	Poor	Yes (Lisduff Fen SAC)	1.12	Yes Habitats including: Petrifying springs with tufa formation and Alkaline fens. Species including: Geyer's Whorl Snail	Moderate. Suitable for lamprey and salmonids	Potential	Potential Lamprey recorded in 2024	Potential Crayfish recorded in 2024	2019: Tracks, slide and potential couch
WCX028	CLAREEN STREAM/FUAR AWN_020 (IE_SH_25C130 600)	Moderate	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	8.11	Yes Wetland and Waterbirds including: Whooper Swan, Wigeon, Teal, Pintail, Shoveler, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and Greenland White-fronted Goose.	Low to Moderate potential. Some suitable gravels present	2016: Trout present No potential	No potential	No potential.	2019: Track from river, potential couches on riverbank. More tracks from river to field.
WCX029	CLAREEN STREAM/FUAR AWN_020 (IE_SH_25C130 600)	Moderate	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	8.59		Low potential. Insufficient gravels	Salmonid potential. Brown trout seen present (n=15. 2—3yrs old)	Lamprey potential, silt on edges, scoop test positive.	Limited crayfish potential due to substrate present and calcification.	Otter potential. Otter foraging potential, no resting potential
WCX030	CAMCOR_040 (IE_SH_25C020 600)	Good	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	9.29		No potential. No suitable habitat	None recorded. No potential.	No potential	No potential	No potential
WCX031	CAMCOR_030 (IE_SH_25C020 500)	Good	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	9.45		Good. High quality, mixed sediments and undercut banks with high quality gravels and mix of riffle and pool throughout survey area. Good Lamprey spawning habitat.	Trout jumping under trees, very good salmonid spawning and nursery habitat	Scoop test positive for 0+ (3cm) juv lamprey. Potential	Crayfish potential.	2019: Otter holt. Slides, couches and tracks present 2016: Otter tracks recorded approximately 650m U/S of Wayleave. 2022: Otter prints found on bank. No couch identified.
WCX032	CAMCOR_030 (IE_SH_25C020 500)	Good	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	9.56		Good potential. Moderate potential for lamprey, good potential for salmonids with suitable spawning habitats however low silt content. Good salmonid spawning and nursery habitat present.	2017: Juvenile salmon recorded 2024: Salmonids recorded Potential	2017: Lamprey ammocoetes present 2020: Lamprey recorded upstream Potential	Crayfish potential.	2019: Potential holt with slide and couch beside river 2024: Otter slide and spraint recorded nearby.

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							Salmonid	Lamprey	Crayfish	Otter
WCX033	CAMCOR_030 (IE_SH_25C020500)	Good	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	10.18		Low potential	Salmonid potential.	Lamprey potential.	No potential	No potential
WCX034	KYLEBOHER_010 (IE_SH_25J270990)	Moderate	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	14.40	Yes Habitats including: Alluvial forests and Alkaline fens. Species including: Otter and Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and wetland and waterbirds	Low potential. No flow, heavily silted substrate	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WCX035	SILVER (KILCORMAC)_030 (IE_SH_25S020400)	Moderate	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	14.02		Low potential	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WCX036	SILVER (KILCORMAC)_020 (IE_SH_25S020200)	Good	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	10.44		Moderate. Moderate flow, sufficient gravel, mixed with silt and sand. Salmonid holding, Spawning & nursery habitat present. Spawning habitat for lamprey in fine gravels.	Salmonid potential.	Lamprey potential. 2020 (downstream): Juvenile river/brook lamprey recorded in scoop test	2017: Crayfish recorded. 2020: Crayfish recorded downstream	Potential 2018: Otter holt, tracks, slide, spraint on edge of Wayleave. 2020 (downstream): crayfish shells recorded on bank.
WCX038	SILVER (KILCORMAC)_020 (IE_SH_25S020200)	Good	Yes (River Shannon Callows SAC & Middle Shannon Callows SPA)	8.52		No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	No potential.	No potential.
WCX039	CLODIAGH (TULLAMORE)_020 (IE_SH_25C060300)	Good	Yes (Charleville Wood SAC)	3.66	Yes Habitats including: Alluvial forests Species including: Desmoulin's Whorl Snail	Moderate. River in flood. Too deep to safely wade or see substrate to identify spawning gravels. Overhanging vegetation and uncut bank exist within wayleave. Same conditions up to 400m d/s.	Brown trout present Moderate potential	Potential 2017: Lamprey recorded 2019: None recorded. Back eddies and slow flowing side channels visible for juv. Lamprey. Too deep to safely wade to do a hand search. Hand search 150m d/s of centreline — none recorded.	Potential 2017: Crayfish recorded. 2019: None observed. Potential for crayfish during lower flows	Otter present
WCX040	CLODIAGH (TULLAMORE)_030 (IE_SH_25C060340)	Moderate	Yes (River Barrow and River Nore SAC)	3.35	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	Low to Moderate potential — trout potential	No potential	No potential	No potential	No potential
WCX041	MEELAGHANS_010	Moderate	Yes (Charleville Wood SAC)	4.77	Yes	Low potential	No potential	No potential	No potential	No potential

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							Salmonid	Lamprey	Crayfish	Otter
	(IE_SH_25M520760)				Habitats including: Alluvial forests Species including: Desmoulin's Whorl Snail					
WCX042	MEELAGHANS_010 (IE_SH_25M520760)	Moderate	Yes (Charleville Wood SAC)	5.93		Low potential. Mainly silt substrate and vegetation with some gravels. Some fine gravels over riffle on edge of wayleave, just d/s and 80m u/s of rail crossing. Uncut bank and overhanging veg recorded. Poor potential within wayleave—heavily veg. Less vegetated and more gravels 150m u/s of wayleave at woodland.	Low potential.	Low potential — checked approximately 10m section of potential suitable habitat 120m d/s of wayleave. Silt substrate checked with hand search and net — no juvenile lamprey recorded. No suitable habitat within wayleave. Soft sediments 150m us of wayleave but no juv lam. (2016)	Kick net sweep d/s of wayleave and within wayleave — none recorded. Good potential — well oxygenated, calcareous, and vegetated watercourse.	2019: Potential otter scat
WCX043	TULLAMORE_020 (IE_SH_25T030100)	Poor	Yes (Charleville Wood SAC)	6.31		No potential. No suitable habitat	None recorded. No potential.	None recorded. Low potential.	None recorded. No potential.	None recorded. No potential.
WCX044	TULLAMORE_010 (IE_SH_25T030030)	—	Yes (Charleville Wood SAC)	9.06		No potential. No spawning habitat recorded within wayleave or 60m u/s or d/s. Watercourse choked with vegetation.	No potential.	Potential habitat for juvenile lamprey in undercut banks.	No potential	No potential.
WCX045	TULLAMORE_010 (IE_SH_25T030030)	Poor	Yes (Charleville Wood SAC)	9.81		Low potential. Watercourse in flood but potential spawning gravels within wayleave visible and potentially good riffle when less flooded. Uncut banks. River enclosed with vegetation.	Low potential.	Low potential	No potential	2019: Track visible in cow pat
WCX047	DAINGEAN_030 (IE_SE_14D060400)	Poor	Yes (River Barrow and River Nore SAC)	14.40	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WCX048	DAINGEAN_030 (IE_SE_14D060400)	Poor	Yes (River Barrow and River Nore SAC)	14.95		Low potential. Too deep to see any potential spawning gravels.	Potential. 2019: None recorded. 2018: Brown Trout recorded.	Low potential — vertical rather than undercut banks.	Low potential — fast flow and no vegetation.	2019: Potential inactive holt in right bankside, overgrown with vegetation. Run from fields into wet ditch, numerous other runs visible

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							Salmonid	Lamprey	Crayfish	Otter
										along ditch heading west. 2024: Good foraging habitat
WCX049	ESKER STREAM_010 (IE_SE_14E010 100)	Moderate	Yes (River Barrow and River Nore SAC)	15.21		Low potential	No potential	Low potential.	Low potential.	2019: Run alongside river at fence with slide entering water. Additional run and slide along rivers edge.
WCX050	ESKER STREAM_020 (IE_SE_14E010 200)	Moderate	Yes (River Barrow and River Nore SAC)	15.08		No potential. Deep bog drain with no flow and peat substrate. No spawning gravels observed. No suitable habitat for juvenile lamprey.	No potential.	No potential.	No potential — acidic pH due to surrounding peatlands and no vegetation in main channel, although instream vegetation present northwest, outside of the Wayleave.	No potential.
WCX051	ESKER STREAM_020 (IE_SE_14E010 200)	Moderate	Yes (River Barrow and River Nore SAC)	14.84		No potential. No suitable habitat	No potential.	No potential.	No potential.	No potential.
WCX053	ESKER STREAM_020 (IE_SE_14E010 200)	Moderate	Yes (River Barrow and River Nore SAC)	14.97		No potential. No suitable habitat	No potential.	No potential.	No potential.	No potential.
WCX054	ESKER STREAM_020 (IE_SE_14E010 200)	Moderate	Yes (River Barrow and River Nore SAC)	15.07		Low potential	No potential.	Potential	No potential	None recorded. Otter potential.
WCX055	FIGILE_030 (IE_SE_14F010 200)	Moderate	Yes (River Barrow and River Nore SAC)	15.50		No potential. Watercourse heavily vegetated and peat substrate.	No potential.	No potential.	No potential — acidic pH due to surrounding peatlands.	2019: Slide going into water, numerous runs in field
WCX056	FIGILE_030 (IE_SE_14F010 200)	Moderate	Yes (River Barrow and River Nore SAC)	15.43		Moderate. River in flood, couldn't see the substrate, but nearby peatland habitat so spawning gravels unlikely. Suitable spawning and holding for salmonids at upstream bridge.	2017: Potential trout recorded (fishing evident)Potential	None recorded. Lamprey potential.	None recorded. Low potential — likely too acidic.	2019: Slide into river, run along edge of river
WCX057	FIGILE_030 (IE_SE_14F010 200)	Moderate	Yes (River Barrow and River Nore SAC)	14.60		No potential. No suitable habitat. Could not view substrate due to high water levels. Surrounding peat habitat makes	Potential	Potential	Potential	None recorded. No potential.

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							Salmonid	Lamprey	Crayfish	Otter
						spawning gravels unlikely.				
WCX058	FIGILE_020 (IE_SE_14F010 100)	Moderate	Yes (River Barrow and River Nore SAC)	14.77		No potential. No flow. Water too deep to view any spawning gravels. Peat surroundings so spawning gravels unlikely.	Potential	Potential	No potential — acidic pH due to surrounding peatlands.	None recorded. No potential.
WCX059	ABBEYLOUGH_ 010 (IE_SE_14A010 840)	Moderate	Yes (River Barrow and River Nore SAC)	16.56		No potential. No suitable habitat	None recorded. Salmonid potential	Potential	Potential	Potential
WCX060	FIGILE_010 (IE_SE_14F010 061)	Poor	Yes (River Barrow and River Nore SAC)	14.37		Limited spawning or nursery habitat for salmonid or lamprey.	None recorded. Low potential.	No potential.	No potential.	No potential.
WCX061	BLACKWATER (LONGWOOD)_ 010 (IE_EA_07B020 060)	Poor	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	14.30	Yes Habitats including: Alkaline fens and Alluvial forests Species including: River Lamprey, Salmon, Otter, and Kingfisher	No potential. Water quality very poor, no flow, stagnant, anoxic odour and oil sleek. Fuel drum in water u/s of wayleave. No gravels. Peat and silt substrate. Bog upstream.	Salmonid potential	Potential	Potential	2019: Potential slide Potential
WCX062	BLACKWATER (LONGWOOD)_ 010 (IE_EA_07B020 060)	Poor	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	15.09		No potential. Too dark and deep to see substrate but likely no gravels. Low flow/ stagnant water. No suitable juvenile lamprey habitat.	Salmonid potential.	Lamprey potential	Potential	Otter potential.
WCX063	BLACKWATER (LONGWOOD)_ 010 (IE_EA_07B020 060)	Poor	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	14.21		No potential. No suitable habitat	No potential.	No potential.	No potential.	No potential.
WCX064	BLACKWATER (LONGWOOD)_ 010 (IE_EA_07B020 060)	Poor	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	13.85		No potential. No suitable habitat. No flow, and peaty substrate. Not suitable for crayfish	None recorded. No potential.	None recorded. Limited potential.	None recorded. No potential.	None recorded. No potential.
WCX065	BLACKWATER (LONGWOOD)_ 010 (IE_EA_07B020 060)	Poor	Yes (River Boyne and River Blackwater SAC & River Boyne and River Blackwater SPA)	13.30		Low potential. Potential for juvenile lamprey due to silt beds. No potential for salmonids — no spawning gravels observed, silt and organic substrate, low flow, poor quality.	None recorded. Low potential — no spawning potential but suitable salmonids habitat — pool and riffles, undercut banks, instream vegetation.	None recorded. Low potential — silt beds	No potential	2019: Run and slides from edge of field into water
WCX066	CLONSHANBO _010	Poor	Yes (Rye Water Valley/Carton SAC)	9.75	Habitats including: Petrifying springs with tufa formation	No potential. No suitable habitat	Potential	Low potential	No potential.	No potential.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
	(IE_EA_09C030 300)				Species including: Narrow-mouthed Whorl Snail and Desmoulin's Whorl Snail					
WCX067	LYREEN_010 (IE_EA_09L020 035)	Poor	Yes (Rye Water Valley/Carton SAC)	8.12		No potential. Low flow, silt substrate, no suitable gravels or riffle.	No potential.	No potential.	Potential	None recorded. No potential.
WCX068	LYREEN_010 (IE_EA_09L020 035)	Poor	Yes (Rye Water Valley/Carton SAC)	7.69		Good. Suitable spawning gravels approx. 200m us of wayleave. Riffle flow. Undercut banks. Overhanging vegetation. No suitable silt beds for juvenile lamprey.	None recorded. Good potential.	None recorded. Moderate potential — suitable spawning gravels approx. 200m us of wayleave. No suitable silt beds for juvenile lamprey. None recorded during kick net sweep and hand search along length of otter transect.	None recorded. No potential — lack of in— stream vegetation.	None recorded. Otter potential.
WCX069	CLONSHANBO _020 (IE_EA_09C030 600)	Poor	Yes (Rye Water Valley/Carton SAC)	7.35		Moderate. Some spawning gravels and riffle within wayleave. Undercut banks and overhanging vegetation. Silt beds with potential for juvenile lamprey	None recorded. Moderate potential.	None recorded. Moderate potential — Silt beds with potential for juvenile lamprey.	None recorded. Low potential — Undercut banks and overhanging vegetation but no instream vegetation.	None recorded. No potential.
WCX070	LYREEN_010 (IE_EA_09L020 035)	Poor	Yes (Rye Water Valley/Carton SAC)	7.31		Low potential	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.	None recorded. Low potential.
WCX071	LIFFEY_140 (IE_EA_09L011 700)	Good	No	—	—	No potential. Some gravels approx. 150m ds of wayleave. Mainly silt substrate and heavily vegetated. Low flow.	No potential.	No potential.	Low potential — silt substrate, heavily vegetated and low flow.	No potential.
WCX072	LIFFEY_140 (IE_EA_09L011 700)	Good	No	—	—	No potential. No gravels or riffle habitat. Watercourse was heavily vegetated with silt substrates and no flow.	No potential.	No potential — silt substrates not suitable for juvenile lamprey, no spawning gravels in close proximity.	Low potential — silt substrate, heavily vegetated and no flow.	No potential.
WCX073	LIFFEY_140 (IE_EA_09L011 700)	Good	No	—	—	Good. River in flood so unable to assess substrate. Likely to be high potential for spawning gravels. Also likely to be suitable silt beds	2017: Salmon, trout recorded Potential	None recorded. Lamprey potential.	2017: Crayfish recorded. Potential	2016: Otter holt recorded 160m south of Wayleave. 2017: Otter (trails) recorded within Wayleave.

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
						during low flow conditions for juvenile lamprey.				
WCX074	REEVES_010 (IE_EA_09R140 550)	Good	No	—	—	No potential. High siltation and no flow. Sediment also not suitable	None recorded. No potential.	None recorded. No potential.	2016: Crayfish caught.	None recorded. No potential.
WCX075	LIFFEY_140 (IE_EA_09L011 700)	Good	No	—	—	No potential. No suitable habitat	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.	None recorded. No potential.
WCX076	LIFFEY_140 (IE_EA_09L011 700)	Good	No	—	—	No potential. No suitable habitat	None recorded No Potential	None recorded No Potential	None recorded No Potential	None recorded No Potential
WCX077	KILMASTULLA_ 050 (IE_SH_25K041 000)	Moderate	Yes (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA)	0	Yes Habitats including: Wetlands, Alluvial forests and Water courses of plain to montane levels Species including: Freshwater Pearl Mussel, Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Common Bottlenose Dolphin and Otter, Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wigeon, Shoveler	Spawning and nursery habitat present	Salmon and brown trout recorded in 2024 Potential	Lamprey scoop test carried out - positive- 5 lamprey 0-2+ years old. Potential	Potential	Potential
WCX078	CAMCOR_050 (IE_SH_25C020 700)	Good	Yes (Dovegrove Callows SPA) & (River Little Brosna Callows SPA)	3.72	Yes Wetland and Waterbirds including: Whooper Swan, Wigeon, Teal, Pintail, Shoveler, Golden Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and Greenland White-fronted Goose.	—	Potential	Potential	Potential	—
WCX079	FIGILE_030 (IE_SE_14F010 200)	Moderate	Yes (River Barrow and River Nore SAC)	16.18	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	None	Potential	Potential	No Potential	Potential
WCX080	FIGILE_030 (IE_SE_14F010 200)	Moderate	Yes (River Barrow and River Nore SAC)	16.22		—	No potential	No potential	No potential	—
WCX081	KILCOMIN STREAM_030 (IE_SH_25K150 085)	Moderate	Yes (Sharavogue Bog SAC)	3.69	Yes Habitats including: Active raised bogs, Degraded raised bogs still capable of natural regeneration, and Depressions on peat substrates of the *Rhynchosporion*	—	No potential	No potential	No potential	—
WCX082	ESKER STREAM_020 (IE_SE_14E010 200)	Moderate	Yes (River Barrow and River Nore SAC)	14.53	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	—	Potential	No potential	No potential	—
WCX083	FIGILE_020 (IE_SE_14F010 100)	Moderate	Yes (River Barrow and River Nore SAC)	16.51		—	Potential	No potential	No potential	—
WCX084	CAMCOR_040 (IE_SH_25C020 600)	Good	Yes (Dovegrove Callows SPA & River Little Brosna Callows SPA)	5.60	Yes Wetland and Waterbirds including: Whooper Swan, Wigeon, Teal, Pintail, Shoveler, Golden	—	No potential	No potential	No potential	—

Waterbody Crossing ID	WFD Waterbody and EU Code	WFD Status (2019-2024)	Links to European Site	Direct Distance to Closest European Site (km)	Aquatic Feature of Interest* (Yes/No)	Spawning Habitat	Protected Species			
							Salmonid	Lamprey	Crayfish	Otter
					Plover, Lapwing, Black-tailed Godwit, Black-headed Gull and Greenland White-fronted Goose.					
WCX085	DAINGEAN_030 (IE_SE_14D060 400)	Poor	Yes (River Barrow and River Nore SAC)	14.78	Yes Habitats including: Petrifying springs with tufa formation, water courses of plain to montane levels, and Alluvial forests Species including: Desmoulin's Whorl Snail, Freshwater Pearl Mussel, White-clawed, Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter	Yes	Potential	Potential	Potential	Potential

Note: — = no data

[a] 'Aquatic Feature of Interest' refers to the designated European sites' 'features of interest' that are aquatic based/dependent rather than terrestrial, and therefore have potential to be affected by impacts on water bodies as a result of the Proposed Project (i.e. source-pathway-receptor). Source of information: SAC and SPA site synopsis (Available at: https://www.npws.ie/protected-sites; Accessed: September 2025)

Tionscadal Soláthair Uisce
Water Supply Project

Natura Impact Statement (NIS)

(Appendix K) 'Restore Favourable Conservation Condition' Objective for the Lower River Shannon Special Area of Conservation

Document no: 32105801/EIAR/NIS/Appendix K
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December 2025

Uisce Éireann
Irish Water

Jacobs

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1. Introduction

1. Uisce Éireann is proposing to develop the Water Supply Project Eastern and Midlands Region (hereafter referred to as the Proposed Project); a proposal to abstract and transfer water from Parteen Basin on the Lower River Shannon in County Tipperary, along a 1.6m diameter pipeline approximately 172km long, through the Eastern and Midlands Region ending in south County Dublin.

2. The Proposed Project avoids all European sites with the exception of the Lower River Shannon Special Area of Conservation (SAC). Parteen Basin, located within the boundaries of the Lower River Shannon SAC, was selected as the location for the Raw Water Intake and Pumping Station (RWI&PS). The footprint of the RWI&PS is 4ha, 1.48ha of which is located along a section of the eastern shore of Parteen Basin within the boundaries of the SAC.

3. There are 14 qualifying interest Annex I habitats and seven qualifying interest Annex II species of the Lower River Shannon SAC. Four of the Annex I habitats and four of the Annex II species have a 'restore favourable conservation condition' objective. The remainder have a 'maintain favourable conservation condition' objective.

4. The assessment undertaken as part of the Natura Impact Statement (NIS) for the Proposed Project found that none of the potential direct or indirect impacts associated with the Proposed Project will affect the conservation objectives of any of the qualifying interest habitats or species of the Lower River Shannon SAC. This report seeks to demonstrate how none of the direct or indirect impacts associated with the Proposed Project will affect the 'restore' objectives, in particular.

2. Qualifying Interests with a Restore Objective within the Zone of Influence

5. The qualifying interest Annex I habitats and Annex II species of the Lower River Shannon SAC, listed in Table 2.1, have a 'restore favourable conservation condition' objective.

Table 2.1: Qualifying Interests of Lower River Shannon SAC with a 'Restore Favourable Conservation Condition' Objective1

Qualifying Interests
Annex I Habitats
*Coastal lagoons [1150]
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]
Mediterranean salt meadows (*Juncetalia maritimi*) [1410]
* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]
Annex II Species
Margaritifera margaritifera (Freshwater pearl mussel) [1029]
Petromyzon marinus (Sea Lamprey) [1095]
Salmo salar (Atlantic salmon) (only in fresh water) [1106]
Lutra lutra (Otter) [1355]

Note:
* indicates a priority habitat

6. Of those listed in Table 2.1, three qualifying interest habitats and one qualifying interest species do not occur within the Zone of Influence (ZoI; as defined in the NIS) of the Proposed Project and are therefore not discussed further: Coastal lagoons [1150], Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330], Mediterranean salt meadows (*Juncetalia maritimi*) [1410] and Freshwater Pearl Mussel (*Margaritifera margaritifera*) [1029].

7. The focus of this memo is therefore on the following qualifying interest habitats and species which do occur within the potential ZoI and have a 'restore' objective.

2.1 Alluvial Woodland

2.1.1 Description

8. Alluvial woodland 91E0 is a generic term for a number of different woodlands. The principal communities within the Lower River Shannon SAC are:

    - Gallery woodland (Salicion albae) (classified as WN5 by Fossitt [2000]) dominated by tree willows forming small, narrow stands on the river banks and islands where the trees are subject to frequent flooding and/or have their roots permanently in water. They occur principally upstream of Limerick
    - Wet willow-alder-ash woodland (WN6) in valley bottoms and locally in flushed areas on the side of steep valleys in the upper reaches of the tributaries.

9. According to the European Commission (2013) alluvial woodland occurs on heavy soils (generally rich in alluvial deposits) periodically inundated by the annual rise of the river (or brook) level, but otherwise well-

[1] *Conservation objectives for Lower River Shannon SAC [002165].* Generic Version 1.0. Department of Arts, Heritage and the Gaeltacht.

drained and aerated during low-water. It is a category defined by hydrology (rather than by any distinct floral assemblage), as it is linked primarily to the occurrence of periodic flooding, mostly by flowing water that leaves a mineral deposit (or alluvium) behind when the waters recede. They occur principally adjacent to rivers and on lakeshores. Woodland fringing turloughs may also be considered as falling into this type. Flooding may occur frequently and at least annually, or infrequently at intervals of several years, but the inundation will nonetheless determine the vegetation. The duration of flooding can vary from a few hours (in the case of tidal flooding) to days, weeks or even months. Given the highly irregular rainfall patterns in Ireland, flooding can occur at any time of the year, although it is more common in the autumn and winter (Cross and Collins 2017). Soils vary from fine alluvium and silt to sands and gravels. The pH is usually above 6.0 but may be lower in uplands valleys.

2.1.2 Area and Distribution

10. The NPWS reports that nationally this habitat has suffered considerable historic losses and is highly fragmented (NPWS 2014). There are many examples of small parcels of woodland which lack the structural diversity that a larger expanse of woodland would have. Fragmented woodlands may be too small to support woodland specialist species due to edge effects, or they may cease to persist because of problems related to new genetic diversity coming into the ecosystem from other woodland parcels due to excessive distances between woodland blocks that cannot be bridged by natural means of dispersal (NPWS 2013a). Peterken (2002; cited in Perrin *et al*. [2008]) suggests that large woods should be maintained above 25ha, with smaller woods being at least 3ha. The high incidence of fragmentation of the habitat resource is cause for concern and, as well as area increases, greater connectivity needs to be established between individual pockets of woodland to decrease their isolation and increase gene and species flow between blocks (NPWS 2013a).

11. Alluvial woodland occurs along the Shannon, in the valley bottoms of the tributaries and on seepage zones on valley sides. The NPWS's Site Synopsis for the Lower River Shannon SAC reports that alluvial woodland occurs on the banks of the Shannon and on islands in the vicinity of the University of Limerick, approximately 13.4km downstream of the RWI&PS site (NPWS 2013b). Within the Lower River Shannon SAC, five sites surveyed as part of the National Survey of Native Woodlands (NSNW; Perrin *et al*. 2008) contain discrete areas of alluvial woodlands (Table 2.2 and Image 2.1). These are small stands, restricted to narrow bands where the ground is subject to flooding or flushing. The total area of these five sites is approximately 8.5ha (Perrin et al. 2008). While the total extent within the SAC is likely to be somewhat greater (the Natura 2000 Standard Data Form for the Lower River Shannon SAC reports there being a total of 15.6ha of this habitat type present [NPWS 2017]), there is an absence of suitable terrain for the occurrence of extensive alluvial woodland (NPWS 2012). It is acknowledged by the NPWS (Dr. John Cross, pers.com.) that the extent of alluvial woodland habitat has expanded in the Lower River Shannon since the construction of the Ardnacrusha Generating Station.

Table 2.2: List of 91E0 Alluvial Woodland sites which are entirely or partially located within the Lower River Shannon SAC, recorded during the National Survey of Native Woodlands (Perrin *et al.* 2008)[3]

NSNW Site Code	County	Name	Area (ha) within SAC	Possible ancient or long-established woodland
1286[1]	Limerick	Clare Glen	1.5	Yes
1577	Clare	Doonass Demesne	1.1	Yes
1857	Limerick	Newgarden North	3.4	No
1861	Tipperary	Knockanavar	c. 1.8[2]	Yes
1995	Limerick	Gortnaskehy	0.7	Yes
		Total Area:	c.8.5	

Note:
[1] Most of the woodland in this NSNW site is within another adjoining SAC – Clare Gen (SAC Site Code: 000930).
[2] The alluvial woodland was not mapped separately, hence the area is estimated.
[3] This table was adapted from the "Conservation Objectives for Lower River Shannon SAC [002165]. Generic Version 1.0. Department of Arts, Heritage and the Gaeltacht"

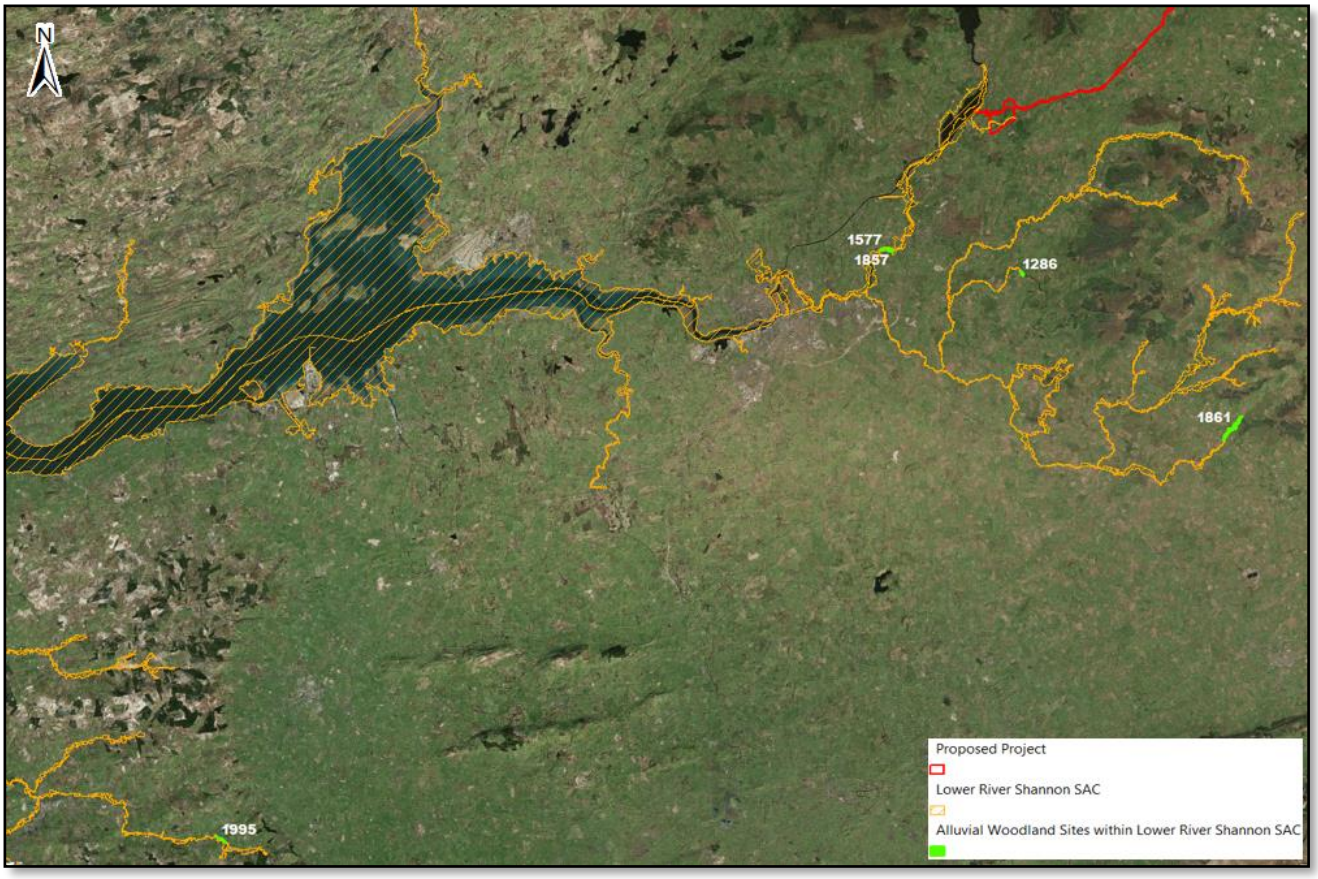


Image 2.1: Locations of 91E0 Alluvial Woodland sites which are entirely or partially within the Lower River Shannon SAC, recorded during the National Survey of Native Woodlands (Perrin *et al.* 2008)

Note:
Numbers in image refer to NSNW site codes, as listed in Table 2.2.
Proposed Project refers to the project boundary at the time of writing.

12. The NPWS reports that the estimate of area of alluvial woodland that occurs nationally within SACs is 10.46 km^2 (or 1,046 hectares). However, the area of alluvial woodland within SACs where it is listed as a qualifying interest is lower, at 8.62 km^2 (or 862 hectares) (NPWS, 2013a). As a proportion of this estimate of the national resource, the estimated 15.6 hectares (NPWS, 2017) of alluvial woodland within the Lower River Shannon SAC represents approximately 1.5% alluvial woodland that occurs nationally within SACs or 1.8% of qualifying interest alluvial woodland within SACs.

2.1.3 Threats

13. The major threats to alluvial woodland include; water management (i.e. drainage, canalization, modification of hydrographic functioning), pollution, spread of invasive non-native species, overgrazing and animal trespass, constraints on expansion, disease (e.g. Chalara or Ash Dieback disease, caused by the fungus *Hymenoscyphus fraxineus*) and undervalued perception of priority woodland (Joint Nature Conservation Committee 2007).

14. The innate fertility of alluvial soils means that many alluvial woodlands have been cleared for agriculture, even if the land is periodically flooded. Drainage has changed the hydrology in many places, leading to woodlands drying out. Many stands are small and fragmented, particularly on deeper soils. These woodlands have rarely been systematically managed for wood production, although larger trees may have been selectively removed. Many are low-growing and often scrubby, with a tangle of fallen trees and deadwood (Cross and Collins 2017).

15. The main pressures and threats documented by the NPWS for alluvial woodland at a national level are indicated in Table 2.3 below.

Table 2.3: Pressures/Threats to Alluvial Woodland at a National Level (NPWS 2013a)

Pressure/Threat	Ranking
Invasive non-native species (I01)	High importance
Problematic native species (I02)	Medium importance
Garbage and solid waste (H05.01)	Low importance
Grazing in forests/ woodland (B06)	Low importance

16. Non-native and invasive species, especially sycamore (*Acer pseudoplatanus*), horse chestnut (*Aesculus hippocastanum*) and beech (*Fagus sylvatica*), and problematic native species such as bramble (*Rubus fruticosus*) and common nettle (*Urtica dioica*) (a consequence of undergrazing) are regarded as the main pressures impacting this habitat (NPWS 2014).

    - Invasive non-native species (I01) have a high incidence and impact a large area of alluvial woodland habitat nationwide, possibly because of the potential of rivers to cause disturbance and to act as a conduit for seeds. In some of the sites reported on, invasive species are the main negative impact noted with approximately one third of those sites studied reporting that invasive species are affecting >50% of the site (NPWS 2013a)
    - Problematic native species (I02) are listed because of consequences arising from undergrazing; brambles are the most usual problem species, with nettles also forming dense stands in some cases, particularly if nutrient enrichment has occurred. Evidence of this impact is reported at approximately 20% of sites studied, with almost two thirds approximately of those reporting that these species are affecting >50% of the site (NPWS 2013a). Higher incidence of wet summers in recent years may have contributed to the problem of undergrazing, with woodlands becoming too wet to support grazers (NPWS 2013a)

- Note that, though H05.01 (the code used for dumping, including fly-tipping and flotsam washed in by rivers/lakes) is listed, its overall impact on the habitat nationally is deemed to be low as usually only small areas, generally at the edges of woodlands, are affected, and the ecological impact, though likely to be negative, is slight. The main danger arises from the potential introduction of invasive alien species (NPWS, 2013a)
- The pressure/threat from grazing (B06) relates to overgrazing, most frequently by cattle, which impacts on regeneration success and also causes nutrient enrichment through dunging. While overgrazing is serious where it occurs, the incidence in wet woodlands nationally is low.

17. Other pressures that have not been listed by the NPWS in the Article 17 monitoring reports, but which operate at a local level or on a small scale include:
    - Thinning of tree layer (B02.06)
    - Water abstractions from groundwater (J02.07; usually caused by drainage of land for forestry or agricultural purposes; occasionally adverse effects due to dredged deposits from cleared drains)
    - Walking, horse-riding & non-motorised vehicles (G01.02; minor trampling issues)
    - Flooding (J02.04.01; alteration of natural flooding regime due to improperly functioning drains, causing long-term inundation and nutrient enrichment)
    - Paths, tracks, cycling tracks (D01.01)
    - Roads/motorways, due to adverse effects on the hydrology of wet woodlands, as well as (in the case of larger roads) noise and pollution impacts from traffic on roads that run along or through woodlands (D01.02).

2.1.4 Natura 2000 Standard Data Form Site Assessment (NPWS 2017)

18. Within the Lower River Shannon SAC, the Natura 2000 Standard Data Form (NPWS 2017) provides a site-based assessment for qualifying interest habitats under the following headings:
    - **Cover:** in hectares (with an indication of the quality of the data relied upon for this figure)
    - **Degree of Representativity:** of the natural habitat type on the site with the following ranking system used
        - A – excellent representativity
        - B – good representativity
        - C – significant representativity
        - D – non-significant presence.
    - **Relative Surface:** area of the site covered by the natural habitat type in relation to the total area covered by that natural habitat type within the national territory, measured as follows:
        - A: 100 >= p >15%
        - B: 15 >= p > 2%
        - C: 2 >= p > 0.
    - **Conservation Status:** degree of conservation of the structure and functions of the natural habitat type concerned and restoration possibilities. This criterion comprises three sub-criteria i) degree of conservation of the structure ii) degree of conservation of the functions iii) restoration possibility with the following ranking system used:
        - A: excellent conservation
        - B: good conservation

  - C: average or reduced conservation.

- **Global Assessment:** an overall summary assessment based on the findings of the above criteria with the following ranking system used:
  - A: excellent value
  - B: good value
  - C: significant value.
- These assessment criteria as applied in the Natura 2000 Standard Data Form (NPWS 2017) for alluvial woodland within the Lower River Shannon SAC are outlined in Table 2.4.

Table 2.4: Natura 2000 Standard Data Form Site Assessment for Alluvial Woodland (NPWS 2017)

Criteria	Assessment
Cover	15.6 hectares with data quality ranked as Moderate (e.g. based on partial data with some extrapolation).
Degree of representativity	B: Good representativity
Relative Surface	C: =< 2%
Conservation Status	B: Good conservation
Global Assessment	C: Significant value

2.1.5 Restoration Techniques

19. The NPWS documents that the following measures are of high importance for alluvial woodland nationally with a view to enhancing the habitat and its conservation status (NPWS 2013a);
    - Restoring/improving the habitat
    - Legal protection of the habitat (within SACs)
    - Restoring/improving the hydrological regime within SACs.

20. There have been some increases in alluvial woodland habitat nationally (as well as improvements to condition of existing areas) because of rehabilitation of three alluvial woodlands covering 136ha within the Coillte estate (NPWS 2013a).

21. The following restoration techniques are techniques that have been used for woodland restoration programmes such as the Coillte 'Woodland Restoration in Ireland' EU LIFE Nature programme (Coillte 2009).
    - Removal of Non-native Trees:

22. A number of different techniques are used across the project sites in removing non-native trees. In some instances, the trees are fully removed to encourage natural regeneration. In other cases, different techniques (fell to recycle, ring-barking) are used to leave standing and lying deadwood to promote structural biodiversity within the woodland. Forest deadwood is now internationally recognised as an important component of woodland biodiversity.
    - Control of Invasive Exotic Shrubs:

23. Exotic shrubs, such as laurel and rhododendron, spread vigorously through many woodlands in Ireland. These shrubs form a dense canopy and prevent the growth of native woodland species. Management of these

shrubs is complex due to their aggressive regeneration, following cutting. Follow-up work is needed to achieve successful control.

- Natural Regeneration of Native Species:

24. In most cases, woodland restoration will be achieved by natural regeneration of native tree species. At present, regeneration of native tree species is prevented by the presence of non-native trees and shrubs. Removal of the non-native plants allows young native trees to regenerate from local seed sources. The aim of the works is to create conditions which will encourage regeneration into the future and allow the establishment and development of the priority woodland types.

- Reinstatement of Natural Water Regimes:

25. The restoration of the bog woodland and alluvial woodland types includes reinstatement of natural water regimes which have been altered by manmade drainage systems. This is achieved by the strategic installation of dams in order to restore, as far as possible, natural water levels. This is especially important for both these priority woodland types.

- Control of Grazing and Animal Trespass:

26. At some sites, both existing and regenerating native trees are threatened by animal grazing. These browsing animals include mainly deer (fallow and sika) and goats. Where required fences are being installed to reduce grazing pressures and promote natural regeneration.

2.2 Sea Lamprey

2.2.1 Overview of Biology

27. Three species of Lamprey occur in Irish waters; Brook Lamprey (*Lampetra planeri*), River Lamprey (*Lampetra fluviatilis*) and Sea Lamprey (*Petromyzon marinus*). The Brook Lamprey is an entirely freshwater animal. The other two species spend most of their adult life in the sea but migrate up to rivers to spawn. Their resultant larvae live in river sediments (Kurz and Costello 1999).

28. Sea Lamprey often spawn (between May and July) in the lower reaches of rivers but also migrate 50 miles and more upstream. They build nests (redds) and spawn in large and small rivers, usually at the downstream end of pools where there is a swift current. Water depth at spawning sites seems to be relatively unimportant, and depths of 5–152cm have been recorded, with an extreme instance of 370cm (Maitland 2003). Sea Lamprey have a preference for sediments made up of small cobbles and pebbles for spawning, which broadly corresponds with Atlantic salmon (*Salmo salar*) requirements for spawning areas. All adult lamprey die after spawning (Kurz and Costello 1999).

29. The larvae, called ammocoetes, hatch about two weeks after the eggs are laid. They then swim out of the nest and are washed downstream, where they accumulate in areas with slower water current, for example backwaters, current eddies or behind big stones on the river bed. There the ammocoetes burrow into stable sandy silt, rich in organic matter, where they remain until they are transformed into adults (Hardisty and Potter 1971).

30. After three to six years, the ammocoetes have usually grown enough to change into small adults which are 10 to 15cm long, have eyes, teeth and a sucking disc. This transformation takes place between July and September and is completed within a few weeks. After the transformation into adults, Sea Lamprey migrate to the sea in autumn/winter and only return to the river to spawn in spring/summer (Maitland and Campbell 1992).

2.2.2 Distribution

31. Went (1946) stated that Sea Lamprey are found in all suitable rivers of Ireland and noted that they are particularly common on the River Shannon. Many years later, the Lower Shannon area is still an important location for Sea Lamprey (Kurz and Costello 1999) and is designated of international conservation importance for its population of Sea Lamprey. Lough Derg is known to contain a landlocked population of Sea Lamprey.

32. One of the best-known Shannon tributaries for Sea Lamprey is the Mulkear River and its catchment (MulkearLIFE 2015a). Many Sea Lamprey locations are along main river reaches immediately downstream of weirs, where Sea Lamprey can be found spawning at high densities and are easily observed (Igoe 2004). On the River Shannon, the presence of a hydroelectric dam at Ardnacrusha restricts the upstream passage of migrating Sea Lamprey. The Mulkear River is located downstream of this dam. As a result, the Mulkear River is the best-known Shannon tributary for Sea Lampreys and substantial numbers can be seen spawning from the road bridge at Annacotty village (MulkearLIFE 2015a). Recent redd count data, following completion of the MulkearLIFE works programme for Sea Lamprey from 2009 to 2014, puts the population at over 400 adults, although it is likely that this number is higher. The relative densities of Sea Lamprey in the lower Mulkear (167 spawning redd per 2000m^2) was highest downstream of Annacotty weir.

2.2.3 Threats

33. Impacts affecting Lamprey species differ from those affecting salmonid and other fish species, due to differing life cycles and habitat requirements.

34. The migrations of anadromous species such as Sea Lamprey are particularly affected by barriers (physical or pollution) because considerable migrations are often necessary from the estuary to the spawning grounds. One extreme belt of pollution between these two habitats can have a major effect on lamprey populations in a river. In a similar way, engineering works of various kinds (e.g. dams and weirs) can be obstacles to upstream migration and the success of local populations of Sea Lamprey. The Sea Lamprey, unlike the salmon, cannot jump. Individuals can negotiate certain types of fish pass and can also use their suctorial mouth to clamp onto the face of a slope and gradually 'suctionclamp' their way up the face of an obstruction, provided that the slope angle is relatively shallow. They are also reported to climb over one another, aggregated at the foot of weirs, in an attempt to overcome the obstruction (Igoe *et al.* 2004). The River Shannon is impounded at two locations. Parteen Weir diverts most of the main River Shannon discharge along a man-made channel to the Ardnacrusha hydroelectric dam (upstream of Limerick city). Some water is allowed down the Old River Shannon channel and Sea Lamprey spawn at a number of locations downstream of Parteen Weir, most notably at Plassey and at Castleconnell. They also spawn in the Kilmastulla River, the confluence of which is approximately 50m downstream of Parteen Weir. Sea Lamprey, however, have never been observed ascending the fish ladder to the main River Shannon at Parteen Weir (P. Barry, pers. comm. noted in Igoe *et al.* 2004). Therefore, their only other entry point to the middle and upper Shannon is over Ardnacrusha Dam. Fish passage facilities are provided at Ardnacrusha by a Borland-McDonald fish loc. An adjacent boat lift may also facilitate limited passage when in use. Data for the period 1994/7 show that less than fifty adult Sea Lamprey ascended the Borland-McDonald lift (O'Connor 2002) in that period, an average of <17 individuals per annum. This is a very low figure considering that the River Shannon drains approximately 18% of Ireland (Igoe *et al.* 2004).

35. In rivers with intermittent flow (e.g. due to hydro schemes) lamprey larvae can live for some time in exposed beds but are often found dead. In general, flow intermittency is considered limiting to ammocoete populations (Morman *et al.* 1980). Low and unstable flows were considered by Morman (1979) to be two of the major limiting factors for the absence or scarcity of larvae in many streams, other factors of importance being pollution, sedimentation and hard or unstable bottoms.

36. Cannalisation can also be damaging to Sea Lamprey, mainly through destruction of their habitat. The removal of areas of riffle and associated spawning gravels, and the dredging of essential nursery silt beds, may entirely eliminate lampreys from a river (Côté *et al.* 1999). According to observations made in the River Barrow catchment, the increased occurrence of flash floods as a result of land drainage schemes had a major negative impact on the lamprey population, as such floods destabilise the river sediments and damage ammocoete habitat (Kurz and Costello 1999). Since a large proportion of the life cycle of lampreys is spent in burrows in silt beds, special attention must be paid to these (not normally considered as important fish habitat), and to spawning gravels, in considering the impact of a proposed development on a river. Fishery management for one group may adversely affect other wildlife and its habitat. For example, action to improve conditions for salmonids (for example, dredging or the provision of fish passes only surmountable by salmonids) may be detrimental to lamprey (Maitland 2003).

37. Three ongoing pressures are identified by the NPWS (2013c) – one impacting on all life stages, one on adult sea lamprey and the third on the juvenile or ammocoete stage. Pollution to surface water is a constant threat to all aquatic organisms. Both adult and ammocoete life stages for lamprey have been shown to be vulnerable to the effects of pollution in Irish systems (D. Byrne & B. Beckett, IFI Blackrock, pers. comm. Referenced in NPWS 2013c). The single largest pressure acting on adult sea lamprey is that of artificial physical barriers to passage for upstream migrating adult fish. The higher concentration of spawning effort downstream of the first major weir on many of Ireland's major sea lamprey rivers indicates a problem with passage (Gargan *et al.* 2011). Barrier removal or modification to permit upstream migration would permit a greater penetration of river channels by adult fish and a greater dispersal of spawning effort, with consequent increased downstream extent of habitat for ammocoetes to colonise. Canalisation is used here as a catch-all term for river drainage works – both as first-phase dredging and as second-phase maintenance of the completed works. Canalisation is undertaken to improve channel capacity for flood flows and to permit land drainage and improvement to agricultural land. This process tends to remove factors in the channel that may tend to slow down water flow e.g. vegetation growth and siltation. This latter process is essential for lamprey ecology as the juvenile or ammocoete stage of the life cycle lives for up to several years burrowed into fine sediment in the river. Adverse impacts of sediment removal in Irish drained rivers are identified in King *et al*. (2008).

38. Bait digging / collection is identified as a potential additional threat to sea lamprey. Fishing tackle shops now regularly display lamprey fillets or segments as bait, particularly for pike. Similarly, angling magazines often identify fillets etc. of smelt, shad and lamprey as among the prime baits. There is a clear potential conflict between the status of conservation species and their identified use as angling bait. In the case of lamprey, it is often stated that the baits are imported as frozen fillets or nuggets etc. There is clearly potential for major export from North America of frozen sea lamprey, given the intensive removal operations being undertaken there for many years. It is not considered that Irish populations of sea lamprey can sustain any exploitation.

39. Conservation measures for the species identified by NPWS (2013c) include legal protection, the Water Framework Directive and collaboration with the OPW on impacts of its drainage maintenance programme but it recognises the need for more work to be done to ensure conservation of lamprey populations and habitat, particularly juvenile habitat.

2.2.4 Natura 2000 Standard Data Form Site Assessment (NPWS 2017)

40. Within the Lower River Shannon SAC, the Natura 2000 Standard Data Form (NPWS 2017) provides a site-based assessment for qualifying interest species under the following headings:

    - **Population:** Size and density of the population of the species present on the site in relation to the populations present within national territory measured as follows:
        - A: 100 >= p >15%
        - B: 15 >= p > 2%

- C: 2 >= p > 0

- D: non-significant (where a population of the species concerned is present on the site in question in a non-significant manner).

- **Conservation:** Degree of conservation of the features of the habitat which are important for the species concerned and possibilities for restoration measured as follows:

  - Criterion (i) Degree of conservation of the features of the habitat important for the species ranked as follows:

    - I: elements in excellent condition
    - II: elements well conserved
    - III: elements in average or partially degraded condition.

  - Criterion (ii) Restoration possibilities:

    - I: restoration easy
    - II: restoration possible with average effort
    - III: restoration difficult or impossible.

  - Synthesis applying to classification of the two above sub-criteria:

    - A: conservation excellent = elements in an excellent condition, independent of the grading of the possibility of restoration
    - B: good conservation = elements well conserved independent of the grading of the possibility of restoration OR elements in average or partially degraded condition and restoration easy
    - C: average or reduced conservation = all other combinations.

- **Isolation:** Degree of isolation of the population present on the site in relation to the natural range of the species measured as follows:

  - A: population (almost) isolated
  - B: population not-isolated, but on margins of area of distribution
  - C: population not-isolated within extended distribution range

- **Global:** global assessment of the value of the site for conservation of the species concerned ranked as follows:

  - A: excellent value
  - B: good value
  - C: significant value.

41. These assessment criteria as applied in the Natura 2000 Standard Data Form (NPWS 2017) for Sea Lamprey within the Lower River Shannon SAC are outlined in Table 2.5.

Table 2.5: Natura 2000 Standard Data Form Site Assessment for Sea Lamprey (NPWS 2017)

Criteria	Assessment
Population	C: =< 2%
Conservation	B: Good conservation
Isolation	C: Population not-isolated within extended distribution range

Criteria	Assessment
Global Assessment	B: Good value

2.2.5 Restoration Techniques

42. To protect and conserve Sea Lamprey populations, known spawning grounds and ammocoetes need to be protected and maintained, and lamprey migrating upstream need unhindered access to spawning grounds. Significant alterations to the drainage patterns of river catchments require careful control and the generally good water quality of river systems supporting Lamprey must be ensured. Care must also be taken that the upstream and downstream migration of Sea Lamprey are not impeded by weirs or dams.

43. Setting aside measures specifically addressing good water quality, primary opportunities to restore Sea Lamprey populations include:

    - Retrofitting and modification of weirs and the customisation of these and other obstacles to facilitate adequate Lamprey passage to assist annual upstream migration for spawning and recruitment
    - Monitoring to determine the success of Sea Lamprey passage pre and post works
    - Careful restoration of stream channel complexity.

2.3 Atlantic Salmon

2.3.1 Overview of Biology

44. The Atlantic salmon is anadromous, i.e. born in freshwater, spends most of its life in the sea and returns to freshwater to spawn. The Lower River Shannon SAC in particular, comes to life from late autumn to early winter as adult salmon return to spawn.

45. The life of an Atlantic salmon begins in spawning streams; adult salmon pair off and move to gravel beds to spawn between November and January. The female will find a gravel bed with a good flow of water and uses her tail to scoop out a hollow in the river bed, while the male fish hovers around the gravel bed driving off any other males which may come too close. The hollow nest is known as a redd. The female deposits her eggs into the redd and these are fertilized by the male which releases its sperm or (milt) into the water beside the eggs. The female then covers her egg deposits with gravel. Many pairs of adults will use the same gravel patch which can be recognized after the spawning season as a selection of mounds in a row. The adult pair, now known as 'slats' or 'spent fish', become thin and will deteriorate and die. Some of the females may return to sea to repeat the process again.

46. **Egg to Alevin**: The next stage of development takes place over the next two to four months while the eggs are incubated in the gravel. An early start before the emergence of other river parasites and invertebrates, is an advantage to the eggs survival. The cold conditions at this time also helps to bring the eggs to the Eyed Ova and then the Alevin stage. The Alevins have a yoke sack, which sustains it while it develops in the safety of the gravel beds. The biggest threat to the Alevins at this stage can be big spring floods, that can wash away incubating gravel.

47. **Alevin to Fry**: When strong enough the Alevins must emerge from the gravel (around April) and rise to the surface of the water and gulp air. By doing this they fill their swim bladder to gain neutral buoyancy making it easier to swim and hold their position in fast flowing streams. This critical period is therefore referred to as "swim-up" and exposes the young to dangerous predators for the first time. Once they begin to swim freely they are called Fry.

48. **Fry to Parr**: Fry feed on microscopic invertebrates and their abundance is regulated by temperature, predation, pollution and competition for food with other fry and other species of fish. Over the Autumn the fry develop into parr with vertical stripes and spots for camouflage.

49. **Parr to Smolt**: In their river habitat, Parr feed on aquatic insects and continue to grow for one to three years while maintaining their territory in the stream, before going to sea.

50. **Smolt to Feeding Adult**: In Spring, large numbers of smolts leave Irish rivers to migrate along the North Atlantic Drift, and into the rich feeding grounds of the Norwegian Sea and the greater expanse of the North Atlantic Ocean. Here they feed primarily on fish such as capelin *(Mallotus villosus)*, herring *(Alosa spp.)*, and sand eel *(*Ammodytes spp.*)*. As they grow quickly fewer predators are able to feed on them. Their rate of growth is therefore critical to survival. Salmon that reach maturity after one year at sea are called Grilse; these return to their river in summer weighing from 0.8 to 4kg. If it takes two or more years at sea to mature the salmon will return considerably earlier in the year and larger at 3 to 15kg (see Salmon Life Cycle at: www.marine.ie).

2.3.2 Distribution

51. Atlantic salmon are native to the river basins of Europe and eastern North America that drain into the North Atlantic Ocean. The species used to be widely distributed in all countries whose rivers enter the North Atlantic, but the species has undergone dramatic decline and has become extinct in many rivers throughout its range.

52. Salmon are widespread throughout Ireland, with 148 Irish salmon rivers and recreational and commercial inshore fisheries occurring – note, coastal fisheries ceased in Ireland in 2007. The Mulkear River, which drains to the River Shannon, together with its principal tributaries (Dead, Bilboa and Newport rivers), drains a catchment area of approximately 650 km² spanning counties Limerick and Tipperary. The Mulkear River is regarded as one of Ireland's top salmon rivers and also sustains populations of Sea Lamprey and Otter. Salmon stocks in the Mulkear River are above their Conservation Limits (CL) (MulkearLIFE 2015b).

53. However, there has been a decrease in salmon production areas throughout the main channel of the River Shannon, mostly due to anthropogenic effects, such as dredging, barriers to migration and water pollution. On the River Shannon main channel, salmon stocks above Parteen Weir and the Ardnacrusha Dam are significantly below their CL (National Parks and Wildlife Services [NPWS] 2012).

2.3.3 Threats

54. In an Irish context, studies have indicated that a number of interrelated factors have all contributed to the dramatic reduction in stock abundance of Atlantic salmon over the past 30 years. Causes can be found in both freshwater and in the sea.

55. Key threats to the freshwater phase are poor water quality resulting from the adverse effects of agriculture, forestry and pollution, amongst other factors. Habitat loss and degradation of juvenile and spawning habitat are also considered significant threats. These threats have arisen due to an intensification of commercial agriculture, water abstraction, development projects and in-stream engineering works including drainage works. In the marine phase there is evidence that the main causes for reduced marine survival include changes in sea surface temperatures, brought about by climate change, over-exploitation of the stock, predation and, in some areas, the negative impact of fish farming, including parasite infestation and the impact of farmed salmon on wild stock (MulkearLIFE 2015b; Inland Fisheries Ireland [IFI] 2019).

56. Atlantic salmon usually return to their natal stream for reproduction, but barriers, such as dams and weirs, as well as river modifications, have become an increasing problem in recent decades. The creation of physical barriers to migration resulting from activities such as dams, poorly designed river crossings, culverts, weirs

and hydroelectric power stations can result in entire sections of rivers, which could normally support a healthy salmon population, being devoid of salmon as a result of poor ecological design (MulkearLIFE 2015b). In Ireland, there are stocks in four major rivers used for hydropower which have been assessed as being below their CL above the impoundments, including; the Upper Liffey (Dublin), Upper Lee (Cork), Upper Shannon (Limerick) and the River Erne (IFI 2018a). According to the conservation objectives for the Lower River Shannon SAC (NPWS 2012), salmon smolt abundance may be significantly affected by mortality passing through hydro-electric turbines. Furthermore, salmon spawn in clean gravels and artificial barriers are currently preventing salmon from accessing suitable spawning habitat on the River Shannon main channel. The abundance of salmon fry at monitored sites on the River Shannon main channel, above the hydro-electric station, is significantly below the target threshold value (i.e. the number of fry per five minutes of electrofishing, currently set at 17 salmon fry).

57. Changes in the freshwater habitat can have a detrimental effect on the carrying capacity of a river for Atlantic salmon. Increased siltation and sedimentation resulting from activities such as poor agricultural practices (lack of buffer zones, cattle poaching etc.) forestry, road development, in-river engineering, construction, gravel and peat abstraction, quarrying and urban runoff etc., can have a detrimental impact on in stream spawning and fry substrates, resulting in smothering of essential habitats and changes in flow regime. Loss of shelter and cover from activities such as removal of riparian and in-river vegetation and substrate alteration can result in the increasing of summer water temperatures, while overplanting of riparian vegetation can result in tunnelling and inhibiting the growth of aquatic vegetation. Invasive plant species can alter the riparian vegetation leading to changes in invertebrate quality and quantity and structural changes in banks, leading to bank erosion and siltation problems. Aquatic invasives outcompeting native species can result in the altering of aquatic ecosystems, leading to a reduction in the abundance of species that provide food for salmon (MulkearLIFE 2015b).

58. Good water quality that supports a healthy and varied aquatic biodiversity is essential for all freshwater stages of Atlantic salmon. Clean, well oxygenated water at relatively low temperatures is essential for salmon and negative changes in water quality through the addition of nutrients and chemicals from activities such as agriculture, industrial and domestic waste water discharges and forestry can impact negatively on salmon. Eutrophication can result in a substantial increase in aquatic vegetation and phytoplankton which contribute to fluctuations in oxygen levels, particularly at night (MulkearLIFE 2015b).

59. Climate change is currently and will in the future, impact on salmon survival and the carrying capacity of rivers through, for example, increased flooding events removing spawning gravels, increasing siltation and summer temperatures. These changes make salmon even more sensitive to the other issues outlined above and the practical management of rivers needs to take this into account.

60. Commercial and recreational salmon fisheries are strictly controlled in Ireland and harvesting of salmon is only permitted on stocks from a single river which are known to have a surplus of fish over the CL. However, in addition to the threats noted above, mixed stock fisheries also present particular threats to stock status. This is due to the different status of individual stocks within the stock complex (International Council for the Exploration of the Sea [ICES] 2014). Mixed stock fisheries introduce greater uncertainty into predicting the effects of management measures and pose a greater threat to small stocks or populations, especially if these are of low relative productivity and/or subject to high exploitation.

2.3.4 Natura 2000 Standard Data Form Site Assessment (NPWS 2017)

61. Within the Lower River Shannon SAC, the Natura 2000 Standard Data Form (NPWS 2017) provides a site-based assessment for qualifying interest species under the same headings as detailed in Section 2.2.4 for Sea Lamprey. These assessment criteria as applied in the Natura 2000 Standard Data Form (NPWS 2017) for Atlantic Salmon within the Lower River Shannon SAC are outlined in Table 2.6.

Table 2.6: Natura 2000 Standard Data Form Site Assessment for Atlantic Salmon (NPWS 2017)

Criteria	Assessment
Population	C: =< 2%
Conservation	A: Average or reduced conservation
Isolation	C: Population not-isolated within extended distribution range
Global Assessment	B: Good value

2.3.5 Restoration Techniques

62. There are significant pressures from a habitat, ecological and water quality perspective, impacting on salmon in the freshwater and marine environment. Addressing these issues in freshwater requires understanding the requirements of salmon and addressing concerns in a systematic and catchment-based approach. Priority should be given to management options that will have the greatest direct (increase in productive capacity) and indirect (overall value of ecosystem services, public relations aspects) benefits relative to the costs of the improvement work. Restoration activities should be evaluated to assess achievement of the objectives and to inform future activities (MulkearLIFE 2015b).

63. A number of related and potentially overlapping management options exist. The key requirements for Atlantic salmon populations which should be considered in any restoration efforts include:

- Adult fish require free and safe passage to natal streams
- They require a river flow regime that is conducive to upstream migration
- They need access to holding areas in rivers (pools), often for prolonged periods (months)
- Spawners require the presence of streambed gravels of appropriate grade
- Salmonid eggs incubate for a prolonged period (three to five months) and the developing embryos require sub-streambed (interstitial) water of good quality and of adequate flow
- Fry must find suitable habitat (i.e. "fry habitat") shortly after emergence from redds. In general, this habitat must be downstream of redds and it must be available within a short distance of the redds (a few hundred metres)
- Parr must have access to suitable habitat (i.e. "parr habitat") but are more capable of dispersing to find it
- The migration of smolts is dependent on river flow and on free and safe passage
- Post-smolts require a coastal environment of adequate quality although the nature of their requirements and any constraints on performance are not well understood
- Sub-adults require access to adequate marine environmental conditions but, again, the nature of these requirements is not well known
- Even when physical environmental quality and habitat availability are adequate, fish can still succumb to excessive predation, or to episodes of disease or excessive parasitic infection (Webb *et al.* 2009)
- The approach to fishery restoration should encompasses some or all of the following elements
- Support for native fish populations and their capacity to take up vacant habitat or to re-colonise restored habitat
- Rehabilitation of natural processes in degraded rivers in order to increase their capacity to support native salmonid populations
- Creation of river habitat to compensate for permanent or long-term losses of natural habitat

- Creation of key habitat to remove or reduce habitat bottlenecks for fish production
- Re-introduction of salmon to rivers where they no longer exist (Webb *et al.* 2009).

64. As discussed in Section 2.3.3, bridges, culverts and weirs that facilitate transport, hydropower and water abstraction can fragment rivers habitat for resident fish species and be a major barrier to migratory species. The Department of Housing, Planning and Local Government has tasked IFI, as part of the overall Water Framework Directive, to develop a georeferenced database of barriers in streams and rivers. This National Barriers Programme (2018–2021) faces a major challenge, with over 70,000 river–road intersections nationwide, and approximately 10% of these possibly problematic for fish passage. A good start has been made by individual teams in the River Basin Districts and by projects like AMBER and RECONNECT (EPA-funded) in collecting data in specific areas. IFI is working with state agencies like the Office of Public Works (OPW), Waterways Ireland and Transport Infrastructure Ireland to identify potential sources of data on obstructions to rivers (IFI 2018b). The retrofitting and modification of weirs and the customisation of these and other obstacles to facilitate adequate salmon passage to assist upstream and downstream migration will provide primary opportunities to restore Atlantic salmon populations.

65. It should be noted, there are limitations on the application of restoration techniques. There is a low likelihood of being able to fully restore some physical/ chemical processes in degraded catchments. For example, in many instances it will not be possible to restore natural drainage patterns in agricultural land or to reduce nitrogen loadings to natural levels. In many settings, the scope for restoration of fisheries will be constrained by the competing needs of other users of the natural resources of river catchments (e.g. farming, forestry, industry and urbanization). Many of the physical and biological processes to be addressed in restoration show high levels of natural variation and low levels of predictability. Relatively long time-scales are associated with many natural processes. Among the physical processes, the least frequent events tend to be of greatest ecological effect (e.g. the 100-year return flood). Any attempt to demonstrate the re-establishment of self-sustaining salmon populations requires a minimum of two life-cycles (around 10 years) of monitoring (Webb *et al.* 2009).

2.4 Otter

2.4.1 Overview of Biology

66. The Eurasian Otter (*Lutra lutra*) is one of the larger members of the Mustelid family of mammals, which, in Ireland, also includes Badger (*Meles meles*), Irish Stoat (*Mustela erminea hibernica*), Pine Marten (*Martes martes*) and the non-native introduced, American Mink (*Mustela vison*).

67. The Otter is carnivorous, principally feeding on fish and crustaceans, including freshwater crayfish and crabs, whilst occasionally taking other prey, such as frogs, small mammals, and waterfowl.

68. Otter births occur predominately between May and August but, Otter cubs may be born at any time of year. There are usually two or three cubs in each litter and cubs are reared over a period of approximately 6 to 12 months. Otters occasionally dig out their own burrows but, more commonly, they make use of existing cavities as resting places or for breeding sites. Holts are often situated within eroded riverbanks, under trees alongside rivers, under fallen trees, within rock piles, or even within dry drainage pipes or culverts. Otters often lie out above ground, especially on small islands or within reed beds, making use of available vegetation to create bedding shaped into small 'couches'. Natal holts used by breeding females are often in secluded areas away from the main river or waterbody (MulkearLIFE 2015c).

2.4.2 Distribution

69. The Otter is relatively common and ubiquitous on rivers and streams in Ireland, but the species has suffered a decline in numbers in many parts of Europe. In studies carried out between 1980 and 2006, it was found

that Otter numbers had declined in Ireland by up to 18%. In more recent times, including national surveys carried out in 2005/06 and 2012/13, it was found that the Otter was recorded at 70.5% of the 525 sites at lakes, rivers and suitable habitats inspected throughout the country (MulkearLIFE 2015c).

70. Many watercourses or areas of open water serve as foraging habitat or as wildlife corridors for Otters. They are often present within urban areas – along canals or rivers that pass through many Irish towns. Whilst the Otter may occasionally travel overland and will cross farmland, bogs or upland areas, it generally confines its movements close to waterways, lakes or wetlands. It was also found that Otters are more common in lowland rather than uplands areas. This is probably a reflection of food availability, due to the fact that larger lowland rivers tend to support a higher biomass of fish. Otters are common along many of Ireland's coasts also, but Otters utilizing the marine environment apparently require access to freshwater habitats to drink and bathe.

71. Each adult Otter has its own home range, which it marks with its spraint at prominent locations. Range sizes vary widely according to the quality of the foraging habitat and other resources, such as suitable sites for Otter dens (holts). Their ranges may alter seasonally to include sites of abundant prey. The average distribution density of Otters is approximately one Otter per 10 km on many Irish watercourses, but this will vary from as little as one Otter per 50 km of river to, perhaps, as much as one Otter per 2 km of river or coastline (National Roads Authority [NRA] 2008). In Ireland, the territory of female Otters in mesotrophic rivers (i.e. those with an intermediate level of productivity) is approximately 7.5 ± 1.5km in length (Ó Néill *et al.* 2008) and 6.5 ± 1.0 km in coastal environments (de Jongh *et al.* 2010). The territory of male Otters in mesotrophic and oligotrophic rivers (i.e. those with a low level of productivity), is approx. 13.2 ± 5.3 km in length with a high degree of variability as territorial males respond quickly to social perturbation (O'Neill *et al.* 2008).

72. A total of 44 SACs have been designated for the conservation of Otter in Ireland. As in other parts of Ireland, the presence of riparian habitat and the availability of suitable food are the key factors determining the abundance of Otters in the Lower River Shannon SAC. Much of Lower River Shannon SAC contains an abundance of these habitat requirements.

2.4.3 Threats

73. The NPWS's Threat Response Plan for the Otter (NPWS 2009), a review of and response to the pressures and threats to Otters in Ireland, categorized three principal risks: i) habitat destruction and degradation; ii) water pollution; and, iii) accidental death and/or persecution.

74. Threats to Otters include the following (Department of Agriculture, Fisheries and Food 2009; NPWS 2009):

- Alteration of the riverbed – dredging, arterial drainage and flood defence works may result in the loss of riparian habitat and a reduction in fish populations
- Destruction of holt sites – drainage works, river restoration works, and bank protection works have the potential to destroy or damage holt sites or reduce the area suitable for holts. This may occur during drainage schemes, river maintenance and vegetation or tree removal
- Disturbance of watercourse banks – increases in human activity may in extreme cases result in an Otter deserting its whole territory
- Water quality – reduction in water quality will reduce the prey availability and may result in Otters having to increase their home range
- Pesticides – Otters are at the top of the food chain and as such they can accumulate high levels of pesticides from their fish prey. This was a major concern in Europe but was not thought to be significant in Ireland (based on work from the 1990s)
- Road deaths – it has been reported that roadkill was probably the most significant cause of direct otter mortality in Ireland. Road schemes have the potential to impact on Otters, consequently the

National Roads Authority published 'Guidelines for the Treatment of Otters Prior to the Construction of National Roads Schemes'

- Accidental trapping – Otters can get entangled in fyke nets, eel traps and crustacean baskets. This accounts for 14 – 17% of reported Otter mortalities in Ireland.

2.4.4 Natura 2000 Standard Data Form Site Assessment (NPWS 2017)

75. Within the Lower River Shannon SAC, the Natura 2000 Standard Data Form (NPWS 2017) provides a site-based assessment for qualifying interest species under the same headings as detailed in Section 2.2.4 for Sea Lamprey. These assessment criteria as applied in the Natura 2000 Standard Data Form (NPWS 2017) for Otter within the Lower River Shannon SAC are outlined in Table 2.7.

Table 2.7: Natura 2000 Standard Data Form Site Assessment for Otter (NPWS 2017)

Criteria	Assessment
Population	C: =< 2%
Conservation	A: Average or reduced conservation
Isolation	C: Population not-isolated within extended distribution range
Global Assessment	A: Excellent value

2.4.5 Restoration Techniques

76. Restoration techniques for Otters include:

- Improvement of Otter habitat through tree planting and enhancement of river connectivity, thus creating wildlife corridors and reconnecting habitats
- Instream habitat restoration work can greatly improve the carrying capacity for fish in a catchment which may in turn increase the density of food and in time, will allow for a higher density of Otters
- Other enhancement works may include the installation of artificial Otter holts at sites degraded in past historical drainage programmes.

77. Conservation efforts should strive to minimize further loss of semi-natural habitats at the landscape-scale, reduce the impacts of development and intensive agricultural practices and improve local-scale habitat diversity around riparian corridors (Lundy & Montgomery 2010).

3. Summary of Restoration Techniques and Determination of Ability to Restore

Table 3.1: Summary of the Lower River Shannon SAC Qualifying Interests with a Restore Objective, Restoration Techniques, and the Determination of Whether or Not the Proposed Project would Impede the Ability to Restore

Attributes and Measures	Target	Potential Impacts Associated with Proposed Project Requiring Mitigation?	Restoration Techniques	Impede Ability to Restore?
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0] *				
To restore the favourable conservation condition of Alluvial forests with Alnus glutinosa and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:				
Habitat area	Area stable or increasing, subject to natural processes, at least c.8.5ha for sites surveyed.	Yes. There are reports of an increase in this habitat type within the Old River Shannon channel since the construction of the Parteen Weir due to a reduction in seasonal flooding (pers. com. Prof. Martin O'Grady and Mr. Paul Murphy). Some areas of woodland which may conform to Alluvial woodland, currently not mapped by NPWS, exist immediately downstream of the bridge at Ballina / Killaloe (approximately 2km north of the Proposed Project). However, no alluvial woodland habitat was recorded within the Proposed Project Area, therefore the habitat area of alluvial woodland will not be directly impacted by the Proposed Project. Furthermore, the Proposed Project will not alter the existing hydrological regime in the Lower River Shannon SAC (i.e. the minimum statutory compensation water flow of 10m^3/s directed to the Old River Shannon at Parteen Weir and the Normal Operating Water Level Band), therefore the habitat area of alluvial woodland will not be indirectly affected by changes to flow or water levels. Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during construction or operation, could potentially negatively affect water quality in downstream receiving environments. There is also a risk that during construction and/or operation non-native invasive species capable of colonising aquatic or wetland habitats could be spread to alluvial woodland habitat within the SAC. In the absence of mitigation these impacts could negatively affect the area, distribution and size of alluvial woodland habitat in the Lower River Shannon SAC.	• Removal of Non-native Trees; • Control of Invasive Exotic Shrubs; • Natural Regeneration of Native Species; • Reinstatement of Natural Water Regimes; and • Control of Grazing and Animal Trespass.	No. There is no proposal to change the Normal Operating Water Level Band limits on Lough Derg / Parteen Basin, and there will be no significant impact on the frequency distribution of water levels in sub-intervals of that band. There is also no proposal to change the compensation water flow to the Old River Shannon, within which the existing woodland has come into equilibrium. With mitigation measures in place, there is no aspect of the Proposed Project which would affect the mix of species within alluvial woodlands, or which would be sensitive to the proposed extent of it, and there will not be any impediment to the carrying out of any of the identified restoration techniques.
Habitat distribution	No decline			
Woodland size	Area stable or increasing. Where topographically possible, 'large' woods at least 25ha in size and 'small' woods at least 3ha in size			
Woodland structure: cover and height	Diverse structure with a relatively closed canopy containing mature trees; sub-canopy layer with semi-mature trees and shrubs; and well-developed herb layer	No. The Proposed Project will not have any significant adverse effect on the existing Alluvial woodland structure: cover and height, in the Lower River Shannon SAC, therefore there is no predicted impact on this target.		
Woodland structure: community diversity & extent	Maintain diversity and extent of community types	Yes. For the reasons set out above, in the absence of mitigation, there is potential for impacts to negatively affect the existing Alluvial woodland structure: community diversity & extent as well as natural regeneration, in the Lower River Shannon SAC.		
Woodland structure: natural regeneration	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy			
Hydrological regime: flooding depth/height of water table	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	No. The Proposed Project will not significantly alter the existing hydrological regime in the Lower River Shannon SAC (i.e. the minimum statutory compensation water flow of 10m^3/s directed to the Old River Shannon at Parteen Weir and the Normal Operating Water Level Band). Therefore, the Proposed Project will not have any significant adverse effects on the existing hydrological regime: flooding depth/height of water table, and there are no predicted impacts on this target.		

Attributes and Measures	Target	Potential Impacts Associated with Proposed Project Requiring Mitigation?	Restoration Techniques	Impede Ability to Restore?
Woodland structure: dead wood	At least 30m³/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems > 40cm diameter (> than 20cm diameter in the case of alder)	No. The Proposed Project will not have any significant adverse effect on the existing Alluvial woodland structure: dead wood, in the Lower River Shannon SAC, therefore there is no predicted impact on this target.		
Woodland structure: veteran trees	No decline	No. The Proposed Project will not have any significant adverse effect on the existing Alluvial woodland structure: veteran trees, in the Lower River Shannon SAC, therefore there is no predicted impact on this target.		
Woodland structure: indicators of local distinctiveness	No decline	Yes. For the reasons set out above, in the absence of mitigation, there is potential for impacts to negatively affect the existing Alluvial woodland structure: indicators of local distinctiveness, in the Lower River Shannon SAC.		
Vegetation composition: native tree cover	No decline. Native tree cover not less than 95%	Yes. For the reasons set out above, in the absence of mitigation, there is potential for impacts to negatively affect the existing vegetation composition: native tree cover, typical species and negative indicator species, in the Lower River Shannon SAC.		
Vegetation composition: typical species	A variety of typical native species present, depending on woodland type, including alder (*Alnus glutinosa*), willows (*Salix spp.*) and, locally, oak (*Quercus robur*) & ash (*Fraxinus excelsior*)			
Vegetation composition: negative indicator species	Negative indicator species, particularly non-native invasive species, absent or under control			
Sea Lamprey *Petromyzon marinus* [1095] **To restore the favourable conservation condition of Sea Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Distribution: extent of anadromy	Greater than 75% of main stem length of rivers accessible from estuary	No. A land-locked population of Sea Lamprey has been recorded in Lough Derg; however, no Sea Lamprey were caught during the 2016 IFI fish stock surveys of Lough Derg and Parteen Basin. No ammocoetes were recorded during the 2017 or 2019 aquatic surveys of the RWI&PS site. Spawning has been recorded in the vicinity of Plassey on the Old River Shannon and is likely to occur at suitable habitats upstream as far as Parteen Weir and also on the River Mulkear. Currently upstream migration of Sea Lamprey is impeded by Parteen Weir and the Ardnacrusha Dam. The Proposed Project will not alter the existing scenario and there will be no additional barrier effects in the Lower River Shannon SAC as a result of the Proposed Project, therefore there is no predicted impact on this target.	• Retrofitting and modification of weirs and the customisation of these and other obstacles to facilitate adequate Lamprey passage to assist annual upstream migration for spawning and recruitment.	No. The Proposed Project will not impede measures to restore connectivity for Sea Lamprey. These measures would be developed by a steering group formed under the RBMP and may involve a fish pass, with gradients and areas of controlled flow velocities to permit Sea Lamprey to move between the Old River Shannon and Parteen Basin (CDM Smith 2021). The Proposed Project can operate alongside such measures.

Attributes and Measures	Target	Potential Impacts Associated with Proposed Project Requiring Mitigation?	Restoration Techniques	Impede Ability to Restore?
Population structure of juveniles	At least three age/size groups present	Yes. There is currently no available data on population structure of juvenile Sea Lamprey within the Lower River Shannon SAC. No Sea Lamprey were caught during the 2016 IFI fish stock surveys of Lough Derg and Parteen Basin and no ammocoetes were recorded during the 2017 or 2019 aquatic surveys of the RWI&PS site. Spawning occurs on the Old River Shannon at Plassey and Castleconnell, and on the Mulkear immediately downstream of the weir at Annacotty. Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during construction or operation, could potentially negatively affect water quality in downstream receiving environments. This impact could negatively affect the population structure of juvenile Sea Lamprey in the Lower River Shannon SAC.	• Retrofitting and modification of weirs and the customisation of these and other obstacles to facilitate adequate Lamprey passage to assist annual upstream migration for spawning and recruitment; and • Careful restoration of stream channel complexity.	No. The Proposed Project will not impede measures to restore connectivity for Sea Lamprey. These measures would be developed by a steering group formed under the RBMP and may involve a fish pass, with gradients and areas of controlled flow velocities to permit Sea Lamprey to move between the Old River Shannon and Parteen Basin (CDM Smith 2021). The Proposed Project can operate alongside such measures. The Proposed Project will not impede the ability to carefully restore stream channel complexity within the Lower River Shannon SAC, upstream or downstream of the RWI&PS. Furthermore, measures to maintain water quality in downstream receiving environments during construction or operation will be implemented to ensure the receiving freshwater environment is protected and impacts on aquatic habitats downstream of the Proposed Project in the Lower River Shannon SAC are avoided.
Juvenile density in fine sediment	Juvenile density at least 1/m²	Yes. There is currently no available data on Sea Lamprey juvenile density in fine sediments within the Lower River Shannon SAC. No Sea Lamprey were caught during the 2016 IFI fish stock surveys of Lough Derg and Parteen Basin and no ammocoetes were recorded during the 2017 or 2019 aquatic surveys of the RWI&PS site. Spawning has been recorded in the vicinity of Plassey, County Limerick on the Old River Shannon and is likely to occur at suitable habitats upstream as far as Parteen Weir and also on the River Mulkear. Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during construction or operation, could influence the quality, extent and availability of any juvenile habitat present downstream of the Proposed Project and affect the density of juvenile lamprey present.	• Careful restoration of stream channel complexity.	No. No suitable lamprey spawning habitat or lamprey ammocoetes were recorded within the vicinity of the RWI&PS during the 2017 or 2019 aquatic surveys. Nevertheless, the bankside design avoids any permanent pipework on the bed of Parteen Basin – the intake of water occurs at the bank of the watercourse, via intake chambers positioned below ground level. The Proposed Project will not impede the ability to carefully restore stream channel complexity within the Lower River Shannon SAC, upstream or downstream of the RWI&PS. Furthermore, measures to maintain water quality in downstream receiving environments during construction or operation will be implemented to ensure the receiving freshwater environment is protected and impacts on aquatic habitats downstream of the Proposed Project in the Lower River Shannon SAC are avoided.
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds	Yes. No suitable lamprey spawning habitat or lamprey ammocoetes were recorded within the vicinity of the RWI&PS during the 2017 or 2019 aquatic surveys. Currently within the Lower River Shannon SAC, spawning appears to be confined to the Old River Shannon downstream of Parteen Weir. Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during construction or operation, could impact lamprey spawning habitat downstream through silt smothering sand/gravel beds. Such impacts could affect the extent and distribution of spawning grounds.	• Retrofitting and modification of weirs and the customisation of these and other obstacles to facilitate adequate Lamprey passage to assist annual upstream migration for spawning and recruitment; and • Careful restoration of stream channel complexity.	No. The Proposed Project will not impede measures to restore connectivity for Sea Lamprey. These measures would be developed by a steering group formed under the RBMP and may involve a fish pass, with gradients and areas of controlled flow velocities to permit Sea Lamprey to move between the Old River Shannon and Parteen Basin (CDM Smith 2021). The Proposed Project can operate alongside such measures. No suitable lamprey spawning habitat or lamprey ammocoetes were recorded within the vicinity of the RWI&PS during the 2017 or 2019 aquatic surveys. Nevertheless, the bankside design avoids any permanent pipework on the bed of Parteen Basin – the intake of water occurs at the bank of the watercourse, via intake chambers positioned below ground level. The Proposed Project will not impede the ability to carefully restore stream channel complexity within the Lower River Shannon SAC, upstream or downstream of the RWI&PS. Furthermore, measures to maintain water quality in downstream receiving environments during construction or operation will be implemented to ensure the receiving freshwater environment is protected and impacts on aquatic habitats downstream of the Proposed Project in the Lower River Shannon SAC are avoided.
Availability of juvenile habitat	More than 50% of sample sites positive	Yes. No ammocoetes were recorded in 2017 or 2019 during core sampling at the RWI&PS site. The Proposed Project will not significantly alter the existing hydrological regime in the Lower River Shannon SAC (i.e. the minimum statutory compensation water flow of 10m^3/s directed to the Old River Shannon at Parteen Weir and the Normal Operating Water Level Band). Therefore, should juvenile habitat (silt beds) occur elsewhere in the Lower River Shannon SAC, it will not be indirectly affected by changes to flow or water levels as a result of the Proposed Project. Furthermore, juvenile lamprey are mobile and are capable of adapting to lowering water levels by relocating to deeper water. Downstream of Parteen Weir the extent of juvenile habitat may have increased due	• Retrofitting and modification of weirs and the customisation of these and other obstacles to facilitate adequate Lamprey passage to assist annual upstream migration for spawning and recruitment; and • Careful restoration of stream channel complexity.	No. The Proposed Project will not impede measures to restore connectivity for Sea Lamprey. These measures would be developed by a steering group formed under the RBMP and may involve a fish pass, with gradients and areas of controlled flow velocities to permit Sea Lamprey to move between the Old River Shannon and Parteen Basin (CDM Smith 2021). The Proposed Project can operate alongside such measures. No suitable lamprey spawning habitat or lamprey ammocoetes were recorded within the vicinity of the RWI&PS during the 2017 or 2019 aquatic surveys. Nevertheless, the bankside

Attributes and Measures	Target	Potential Impacts Associated with Proposed Project Requiring Mitigation?	Restoration Techniques	Impede Ability to Restore?
		to the reduction in spate flows on Old River Shannon as a result of Parteen Weir. The Proposed Project will not alter the current scenario. Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during construction or operation, could however influence the quality, extent and availability of any juvenile habitat present downstream of the Proposed Project.		design avoids any permanent pipework on the bed of Parteen Basin – the intake of water occurs at the bank of the watercourse, via intake chambers positioned below ground level. The Proposed Project will not impede the ability to carefully restore stream channel complexity within the Lower River Shannon SAC, upstream or downstream of the RWI&PS. Furthermore, measures to maintain water quality in downstream receiving environments during construction or operation will be implemented to ensure the receiving freshwater environment is protected and impacts on aquatic habitats downstream of the Proposed Project in the Lower River Shannon SAC are avoided.
Atlantic Salmon *Salmo salar* [1106] **To restore the favourable conservation condition of Salmon in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Distribution: extent of anadromy	100% of river channels down to second order accessible from estuary	No. Currently upstream and downstream migration of Atlantic salmon is impeded by Parteen Weir and the Ardnacrusha Dam. The Proposed Project will not alter the existing scenario and there will be no additional barrier effects in the Lower River Shannon SAC as a result of the Proposed Project, therefore there is no predicted impact on this target.	• Retrofitting and modification of weirs and the customisation of these and other obstacles to facilitate adequate salmon passage to assist upstream and downstream migration.	No. The Proposed Project will not impede measures to restore connectivity for Atlantic Salmon. These measures would be developed by a steering group formed under the RBMP and may involve a fish pass, with gradients to permit Atlantic salmon to move between the Old River Shannon and Parteen Basin (CDM Smith 2021). The Proposed Project can operate alongside such measures and can accommodate redirection of a suitable fraction of the compensation flow to such a connectivity feature.
Adult spawning fish	Conservation Limit (CL) for each system consistently exceeded	No. The conservation limit for the River Shannon is 49,638 salmon per year; however, the average upstream salmon count passing through Parteen Weir and Ardnacrusha Dam each year are known to be considerably less since the construction of the barrier to the present date. The Proposed Project will not alter the existing scenario and there will be no additional barrier effects in the Lower River Shannon SAC as a result of the Proposed Project, therefore there is no predicted impact on this target.	• Retrofitting and modification of weirs and the customisation of these and other obstacles to facilitate adequate salmon passage to assist upstream and downstream migration.	No. The Proposed Project will not impede measures to restore connectivity for Atlantic Salmon. These measures would be developed by a steering group formed under the RBMP and may involve a fish pass, with gradients to permit Atlantic salmon to move between the Old River Shannon and Parteen Basin (CDM Smith 2021). The Proposed Project can operate alongside such measures and can accommodate redirection of a suitable fraction of the compensation flow to such a connectivity feature.
Salmon fry abundance	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling	No. The Proposed Project will not have any significant adverse effect on salmon fry abundance in the Lower River Shannon SAC, therefore there is no predicted impact on this target.	• Careful restoration of stream channel complexity.	No. No suitable Atlantic salmon spawning habitat was recorded within the vicinity of the RWI&PS during the 2017 or 2019 aquatic surveys. Nevertheless, the bankside design avoids any permanent pipework on the bed of Parteen Basin – the intake of water occurs at the bank of the watercourse, via intake chambers positioned below ground level. The Proposed Project will not impede the ability to carefully restore stream channel complexity within the Lower River Shannon SAC, upstream or downstream of the RWI&PS. Furthermore, measures to maintain water quality in downstream receiving environments during construction or operation will be implemented to ensure the receiving freshwater environment is protected and impacts on aquatic habitats downstream of the Proposed Project in the Lower River Shannon SAC are avoided.
Out-migrating smolt abundance	No significant decline	No. Currently there is a Borland type fish pass at Ardnacrusha Dam which accommodates upstream migration of fish. However, fish descending the system do so through the turbines at Ardnacrusha Generating Station or over the spillway at Parteen Weir. The success of fish passage through the Ardnacrusha Generating Station and Parteen Weir is unknown however it is believed that a considerable number of fish mortalities occur as a result of fish migrating downstream through the turbines. The Proposed Project will not alter the existing infrastructure and there will be no additional barrier effects in the Lower River Shannon SAC as a result of the Proposed Project, therefore there is no predicted impact on this target.	• Retrofitting and modification of weirs and the customisation of these and other obstacles to facilitate adequate salmon passage to assist upstream and downstream migration.	No. The Proposed Project will not change the generator discharge rate at the Ardnacrusha Generating Station, however the duration of discharges will be reduced by approximately 2% on average. This will result in lower volumes of flow through the Ardnacrusha Generating Station through an unchanged generator flow rate operating for a shorter period of time, with marginally longer periods of no flow through Ardnacrusha. Smolts migrating downstream would likely marginally benefit from this scenario as smolts are attracted to higher flows. During reduced periods of hydropower generation, they would therefore be encouraged to migrate downstream over Parteen Weir, instead of through the turbines at Ardnacrusha. Furthermore, within operating guidelines which seek to increase late spring water levels to the upper limit of the Normal Operating Water Level Band, the Proposed Project would not impede

Attributes and Measures	Target	Potential Impacts Associated with Proposed Project Requiring Mitigation?	Restoration Techniques	Impede Ability to Restore?
				the ability to offset appropriate hydropower flows, with increased flow to the Old River Shannon during periods of smolt migration (April).
Number and distribution of redds	No decline in number and distribution of spawning redds due to anthropogenic causes	No. The Proposed Project will not have any significant adverse effect on the number and distribution of redds in the Lower River Shannon SAC, therefore there is no predicted impact on this target.	• Careful restoration of stream channel complexity.	No. No suitable Atlantic salmon spawning habitat was recorded within the vicinity of the RWI&PS during the 2017 or 2019 aquatic surveys. Nevertheless, the bankside design avoids any permanent pipework on the bed of Parteen Basin – the intake of water occurs at the bank of the watercourse, via intake chambers positioned below ground level. The Proposed Project will not impede the ability to carefully restore stream channel complexity within the Lower River Shannon SAC, upstream or downstream of the RWI&PS. Furthermore, measures to maintain water quality in downstream receiving environments during construction or operation will be implemented to ensure the receiving freshwater environment is protected and impacts on aquatic habitats downstream of the Proposed Project in the Lower River Shannon SAC are avoided.
Water quality	At least Q4 at all sites sampled by EPA	Yes. Deep excavation along the shoreline of Parteen Basin, required for the construction of the RWI&PS, or an accidental pollution event of a sufficient magnitude during construction or operation, could potentially negatively affect water quality in downstream receiving environments.	• Prevent diffuse and point source pollution; and • Reduce the impacts of development and intensive agricultural practices and improve local-scale habitat diversity around riparian corridors.	No. The bankside design avoids any permanent pipework on the bed of Parteen Basin – the intake of water occurs at the bank of the watercourse, via intake chambers positioned below ground level. Measures to maintain water quality in downstream receiving environments during construction or operation will be implemented to ensure the receiving freshwater environment is protected and impacts on aquatic habitats downstream of the Proposed Project in the Lower River Shannon SAC are avoided.
European Otter *Lutra lutra* [1355] **To restore the favourable conservation condition of Otter in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**				
Distribution	No significant decline	Yes. No Otter holts or couches were recorded in the vicinity of the RWI&PS; however, activity and foraging are likely to occur in the area. The construction of the RWI&PS will result in the permanent loss of approximately 960m^2 of Otter habitat on the eastern shore of Parteen Basin, which is less than 0.01% of the total extent of terrestrial habitat available in the Lower River Shannon SAC, which is not considered to constitute a significant decline and will not impact Otter distribution. This assessment is made on the basis that the habitat loss and changes associated with the Proposed Project will not reduce the number of available breeding or resting places, will not affect prey availability or abundance and will therefore, not affect the local Otter population's ability to maintain itself in the long or short term. The construction of the RWI&PS has the potential to cause Otter habitat fragmentation and a barrier to Otter movement along the shore of Parteen Basin during the construction and operational phase. Construction of the RWI will likely be completed within a 26-month period from site clearance to demobilisation, therefore any barrier effect created would not result in any long-term effects on the local Otter population. However, permanent security fencing will be erected around the perimeter of the RWI&PS infrastructure on the bank of Parteen Basin. In the absence of appropriate mitigation this may present a barrier effect to Otter within the Lower River Shannon catchment. The construction of the RWI&PS on the bank of Parteen Basin increases the risk of construction machinery collisions with Otter.	• Improvement of Otter habitat through tree planting and enhancement of river connectivity, thus creating wildlife corridors and reconnecting habitats.	No. The Proposed Project will not impede measures to restore river connectivity for Otter. To avoid the RWI&PS causing Otter habitat fragmentation and presenting a barrier to Otter movement, Otter passage facilities will be provided. Mammal passes will be constructed in accordance with the '*Guideline for the Treatment of Otters prior to the Construction of National Road Schemes*' (NRA 2008). The Proposed Project can operate alongside such measures.
Extent of terrestrial habitat	No significant decline. Area mapped and calculated as 596.8ha above high water mark (HWM); 958.9ha along river banks/ around ponds	No. The construction of the RWI&PS will result in the permanent loss of approximately 960m^2 of Otter habitat on the eastern shore of Parteen Basin, which is less than 0.01% of the total extent of terrestrial habitat available in the Lower River Shannon SAC, which is not considered to constitute a significant decline and will not impact Otter distribution. This assessment is made on the basis that the habitat loss and changes associated with the Proposed Project will not reduce the number of	• Improvement of Otter habitat through tree planting and enhancement of river connectivity, thus creating wildlife corridors and reconnecting habitats; and • Conservation efforts should strive to minimize further loss of semi-natural habitats at the landscape-scale, reduce the impacts of development and intensive	No. The Proposed Project will not impede measures to improve or restore Otter habitat. The construction of the RWI&PS will result in the permanent loss of approximately 960m^2 of Otter habitat on the eastern shore of Parteen Basin, which is less than 0.01% of the total extent of terrestrial habitat available in the Lower River Shannon SAC, which is not considered to constitute a significant decline and will not impact Otter distribution. To avoid the RWI&PS

Attributes and Measures	Target	Potential Impacts Associated with Proposed Project Requiring Mitigation?	Restoration Techniques	Impede Ability to Restore?
		available breeding or resting places (note: no Otter holts or couches were recorded in the vicinity of the RWI&PS), will not affect prey availability or abundance and will therefore, not affect the local Otter population's ability to maintain itself in the long or short term.	agricultural practices and improve local-scale habitat diversity around riparian corridors.	causing Otter habitat fragmentation and presenting a barrier to Otter movement, Otter passage facilities will be provided. Mammal passes will be constructed in accordance with the '*Guideline for the Treatment of Otters prior to the Construction of National Road Schemes*' (NRA 2008). The Proposed Project can operate alongside such measures.
Extent of marine habitat	No significant decline. Area mapped and calculated as 4,461.6ha	No. The Proposed Project will not have any significant adverse effect on the extent of marine habitat in the Lower River Shannon SAC, therefore there is no predicted impact on this target.	• Improvement of Otter habitat through tree planting and enhancement of river connectivity, thus creating wildlife corridors and reconnecting habitats; and • Conservation efforts should strive to minimize further loss of semi-natural habitats at the landscape-scale, reduce the impacts of development and intensive agricultural practices and improve local-scale habitat diversity around riparian corridors.	No. The Proposed Project will not impede measures to improve or restore Otter habitat. The marine environment is not within the ZoI of the Proposed Project and as such the Proposed Project can operate alongside any restoration measures for marine habitats.
Extent of freshwater (river) habitat	No significant decline. Length mapped and calculated as 500.1km	No. The Proposed Project will not have any significant adverse effect on the extent of freshwater (river) habitat in the Lower River Shannon SAC, therefore there is no predicted impact on this target.	• Improvement of Otter habitat through tree planting and enhancement of river connectivity, thus creating wildlife corridors and reconnecting habitats; and • Conservation efforts should strive to minimize further loss of semi-natural habitats at the landscape-scale, reduce the impacts of development and intensive agricultural practices and improve local-scale habitat diversity around riparian corridors.	No. The Proposed Project will not impede measures to improve or restore Otter habitat. The bankside design avoids any permanent pipework on the bed of Parteen Basin – the intake of water occurs at the bank of the watercourse, via intake chambers positioned below ground level. The Proposed Project will not impede the ability to carefully restore stream channel complexity within the Lower River Shannon SAC, upstream or downstream of the RWI&PS.
Extent of freshwater (lake/lagoon) habitat	No significant decline. Area mapped and calculated as 125.6ha	No. The Proposed Project will not have any significant adverse effect on the extent of freshwater (lake/lagoon) habitat in the Lower River Shannon SAC, therefore there is no predicted impact on this target.	• Improvement of Otter habitat through tree planting and enhancement of river connectivity, thus creating wildlife corridors and reconnecting habitats; and • Conservation efforts should strive to minimize further loss of semi-natural habitats at the landscape-scale, reduce the impacts of development and intensive agricultural practices and improve local-scale habitat diversity around riparian corridors.	No. The Proposed Project will not impede measures to improve or restore Otter habitat. The bankside design avoids any permanent pipework on the bed of Parteen Basin – the intake of water occurs at the bank of the watercourse, via intake chambers positioned below ground level. The Proposed Project will not impede the ability to carefully restore stream channel complexity within the Lower River Shannon SAC, upstream or downstream of the RWI&PS.
Couching sites and holts	No significant decline	No. No Otter holts or couches were recorded in the vicinity of the RWI&PS, therefore there will be no effect on couches or holt sites as a result of the Proposed Project. Preconstruction survey should be undertaken to ensure no development of couch or holts since the earlier surveys undertaken (latest October 2024).	• Minimize further loss of semi-natural habitats at the landscape-scale, reduce the impacts of development and intensive agricultural practices and improve local-scale habitat diversity around riparian corridors; and • Installation of artificial Otter holts at sites degraded in past historical drainage programmes.	No. No Otter holts or couches were recorded in the vicinity of the RWI&PS during the latest survey in October 2024. The Proposed Project will not impede measures to improve or restore Otter habitat. The construction of the RWI&PS will result in the permanent loss of approximately 960m^2 of Otter habitat on the eastern shore of Parteen Basin, which is less than 0.01% of the total extent of terrestrial habitat available in the Lower River Shannon SAC, which is not considered to constitute a significant decline and will not impact Otter distribution. To avoid the RWI&PS causing Otter habitat fragmentation and presenting a barrier to Otter movement, Otter passage facilities will be provided. Mammal passes will be constructed in accordance with the '*Guideline for the Treatment of Otters prior to the Construction of National Road Schemes*' (NRA 2008). The Proposed Project can operate alongside such measures.
Fish biomass available	No significant decline	No. The Proposed Project will not have any significant adverse effect on the fish biomass available in the Lower River Shannon SAC, therefore there is no predicted impact on this target.	• Prevent diffuse and point source pollution; • Reduce the impacts of development and intensive agricultural practices and improve local-scale habitat diversity around riparian corridors; • Retrofitting and modification of weirs and the customisation of these and other obstacles to facilitate adequate fish passage to assist annual	No. There is no aspect of the Proposed Project which would impede the ability to carry out any of the identified restoration techniques. The Proposed Project will not impede measures to restore connectivity for fish. These measures would be developed by a steering group formed under the RBMP and may involve a fish pass, with gradients to permit fish to move between the Old River Shannon and Parteen Basin (CDM Smith 2021). The Proposed Project can operate alongside such measures and

Attributes and Measures	Target	Potential Impacts Associated with Proposed Project Requiring Mitigation?	Restoration Techniques	Impede Ability to Restore?
			upstream migration for spawning and recruitment; and • Careful restoration of stream channel complexity.	can accommodate redirection of a suitable fraction of the compensation flow to such a connectivity feature. The Proposed Project will not impede the ability to carefully restore stream channel complexity within the Lower River Shannon SAC, upstream or downstream of the RWI&PS. Furthermore, measures to maintain water quality in downstream receiving environments during construction or operation will be implemented to ensure the receiving freshwater environment is protected and impacts on aquatic habitats downstream of the Proposed Project in the Lower River Shannon SAC are avoided.
Barriers to connectivity	No significant increase.	Yes. The construction of the RWI&PS will locally impede movement along the shore, but due to the nature of the Parteen Basin, this is not likely to present a significant impediment to habitat continuity.	• Improvement of Otter habitat through tree planting and enhancement of river connectivity, thus creating wildlife corridors and reconnecting habitats.	No. The Proposed Project will not impede measures to restore river connectivity for Otter. To avoid the RWI&PS causing Otter habitat fragmentation and presenting a barrier to Otter movement, Otter passage facilities will be provided. Mammal passes will be constructed in accordance with the '*Guideline for the Treatment of Otters prior to the Construction of National Road Schemes*' (NRA 2008). The Proposed Project can operate alongside such measures.

4. References

- CDM Smith (2021). Roadmap for the Lower River Shannon Report 2021. Provision of Expert Advisory Services Regarding Fish Migration in the Lower River Shannon Catchment. Prepared by CDM Smith for the Department of Housing, Local Government and Heritage (CDM Smith (2021). Fish Pass Feasibility Study)
- Coillte (2009). Restoring Priority Woodland Habitats in Ireland LIFE05 NAT/IRL/000182. After Life Conservation Plan. 1st April 2006 – 31st December 2009). Available at http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=home.showFile&rep=file&fil=LIFE05_NAT_IRL_000182_AfterLIFE.pdf [Accessed: January 2019].
- Cross, J.R. & Collins, K.D. 2017. Management Guidelines for Ireland's Native Woodlands. Jointly published by the National Parks & Wildlife Service (Department of Arts, Heritage, Regional, Rural & Gaeltacht Affairs) and the Forest Service. Forest Service, Department of Agriculture, Food & the Marine, Kildare Street, Dublin 2, Ireland.
- de Jongh, A., O'Neill, L. & de Jong, T. (2010). Coastal otters (*Lutra lutra*) in Roaringwater Bay, Ireland. Unpublished Report to NPWS.
- Department of Agriculture, Fisheries and Food (2009). Forestry and Otter Guidelines. Forest Service. Available at https://www.agriculture.gov.ie/media/migration/forestry/forestservicegeneralinformation/kerryslugandotter/091207ForestryandOttersGuidelines211209.pdf. [Accessed: January 2019].
- European Commission. Environment Directorate-General. (2013). The Interpretation Manual of European Union Habitats—EUR28. *Nature ENV B.3.*
- Fossitt, J. A. (2000). *A guide to habitats in Ireland*. Heritage Council/Chomhairle Oidhreachta.
- Gargan, P. G., Roche, W. K., Keane, S., King, J. J., Cullagh, A., Mills, P., & O'Keeffe, J. (2011). Comparison of field-and GIS-based assessments of barriers to Atlantic salmon migration: a case study in the Nore Catchment, Republic of Ireland. *Journal of Applied Ichthyology*, *27*, 66-72.
- Hardisty, M. W., & Potter, I. C. (1971). The behaviour, ecology and growth of larval lampreys. Academic Press.
- Igoe, F., Quigley, D. T. G., Marnell, F., Meskell, E., O'Connor, W., & Byrne, C. (2004, December). The sea lamprey Petromyzon marinus (L.), river lamprey Lampetra fluviatilis (L.) and brook lamprey Lampetra planeri (Bloch) in Ireland: general biology, ecology, distribution and status with recommendations for conservation. In *Biology and Environment: Proceedings of the Royal Irish Academy* (pp. 43-56). Royal Irish Academy.
- International Council for the Exploration of the Sea (ICES). 2014. Report of the Working Group on North Atlantic Salmon (WGNAS), 19–28 March 2014, Copenhagen, Denmark. ICES CM 2014/ACOM:09. 433 pp.
- Inland Fisheries Ireland (IFI). (2018a). Report of the Technical Expert Group on Salmon – to Inland Fisheries Ireland (IFI) The Status of Irish Salmon Stocks in 2017 with Catch Advice for 2018 January 2018. Available at https://www.fisheriesireland.ie/extranet/fisheries-management-1/salmon/1496-the-status-of-irish-salmon-stocks-in-2017-with-catch-advice-for-2018/file.html. [Accessed: January 2019].
- Inland Fisheries Ireland (IFI). (2018b). Development in Inland Fisheries Ireland Research. Issue 6. Spring 2018. Available at https://www.fisheriesireland.ie/extranet/fisheries-research-1/1497-research-newsletter-no-6/file.html. [Accessed: January 2019].
- Inland Fisheries Ireland (IFI). (2019). Freshwater Fish Species – Atlantic Salmon. Available at https://www.fisheriesireland.ie/fish-species/atlantic-salmon.html#conservation-legal-status. [Accessed: January 2019].
- Joint Nature Conservation Committee. 2007. Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006. Peterborough: JNCC. Available at: www.jncc.gov.uk/article17. [Accessed: January 2019].

- King, J. J., Hanna, G., & Wightman, G. D. (2008). Ecological Impact Assessment (EcIA) of the Effects of Statutory Arterial Drainage Maintenance Activities on Three Lamprey Species (Lampetra Planeri Bolch, Lampetra Fluviatilis L. and Petromyzon Marinis L.). OPW Environment Section.
- Kurz, I., & Costello, M. J. (1999). An outline of the biology, distribution and conservation of lampreys in Ireland. Dúchas.
- Lundy, M.G. & Montgomery, W.I. (2010). A multi-scale analysis of the habitat associations of European otter and American mink and the implications for farm scale conservation schemes. Biodiversity Conservation 19: 3849-3859.
- Maitland, P. S., & Campbell, R. N. (1992). *Freshwater fishes of the British Isles* (Vol. 75). HarperCollins.
- Maitland, P. S. (2003). Ecology of the River, Brook and Sea Lamprey: Lampetra Fluviatilis, Lampetra Planeri and Petromyzon Marinus. Life in UK Rivers.
- Morman, R. H. (1979). Distribution and ecology of lampreys in the lower peninsula of Michigan, 1957-75. Great Lakes Fishery Commission.
- Morman, R. H., Cuddy, D. W., & Rugen, P. C. (1980). Factors influencing the distribution of sea lamprey (Petromyzon marinus) in the Great Lakes. *Canadian Journal of Fisheries and Aquatic Sciences*, *37*(11), 1811-1826.
- MulkearLIFE (2015a). Management of Upstream Passage for Adult Sea Lamprey in SACs. Drawing on the Experience of MulkearLIFE 2009 to 2014. Best Practice Guide Number Two. Available at http://mulkearlife.com/wp-content/uploads/2015/05/MulkearLIFE_BP_Lamprey-FINAL.pdf. [Accessed: January 2019].
- MulkearLIFE (2015b). Best Practice Guide Number 1. Enhancement of Atlantic Salmon Population and Biodiversity Considerations of Habitat Restoration in SACs. Available at http://mulkearlife.com/wp-content/uploads/2015/05/MulkearLIFE_BP_Salmon_FINAL180515_.pdf. [Accessed: January 2019].
- MulkearLIFE (2015c). Management Guidelines for European Otter (*Lutra lutra*) in SACs. Drawing on the Experience of MulkearLIFE 2009 to 2014. Best Practice Guide Number Three. Available at http://mulkearlife.com/wp-content/uploads/2015/05/MulkearLIFE_BP_OTTERS-FINAL.pdf. [Accessed: January 2019].
- National Parks and Wildlife Services (NPWS) (2009). Threat response plan: Otter (2009-2011) National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland
- National Parks and Wildlife Services (NPWS) (2012). Conservation Objectives: Lower River Shannon SAC 002165. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- National Parks and Wildlife Services (NPWS) (2013a). The Status of EU Protected Habitats and Species in Ireland – Habitats Assessments Volume 2.
- National Parks and Wildlife Services (NPWS) (2013b). Site Synopsis for the Lower River Shannon SAC 002165. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht
- National Parks and Wildlife Services (NPWS) (2013c). The Status of EU Protected Habitats and Species in Ireland – Species Assessments Volume 3.
- National Parks and Wildlife Services (NPWS) (2014). The Status of EU Protected Habitats and Species in Ireland – Overview Report Volume 1.
- National Parks and Wildlife Services (NPWS) (2017). Natura 2000 – Standard Data Form for the Lower River Shannon SAC.
- National Roads Authority (NRA) (2008). Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes. Environmental Series on Construction Impacts. Available at: http://www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Treatment-of-Otters-prior-to-the-Construction-of-National-Road-Schemes.pdf. [Accessed: January 2019].
- O'Connor, W. (2002). Biology and management of European eel Anguilla anguilla L. in the Shannon Estuary, Ireland (Doctoral dissertation, PhD thesis. National University of Ireland).

- Ó Néill L. (2008). Population dynamics of the Eurasian otter in Ireland. Integrating density and demography into conservation planning. PhD thesis. Trinity College, Dublin.
- Perrin, P., Martin, J., Barron, S., O'Neill, F., McNutt, K., & Delaney, A. (2008). National survey of native woodlands 2003–2008. *National Parks and Wildlife Service, Dublin*.
- Peterken, G. (2002). Reversing the habitat fragmentation of British woodlands. WWF-UK. London.
- Webb, J., Youngson, A., & Verspoor, E. (2009). Restoration Guidance for West Coast Salmon and Sea Trout Fisheries. *Tripartite Working Group. 31p*.
- Went, A. E. J. (1946). Irish freshwater fish. *Salmon Trout Mag*, *118*, 248-256.

Tionscadal Soláthair Uisce
Water Supply Project

Natura Impact Statement (NIS)

(Appendix L) Projects Considered for In-Combination Effects

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December 2025

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Table 1: Screening of Projects within the Zone of Influence of the Proposed Project for Potential In-Combination Effects

Authority	Application Reference	Description and Address	Tier	Distance in Relation to the Proposed Project	Source-Pathway-Receptor (Yes/No)	Potential for In-Combination Effects
Dublin City Council	LRD6054/24-S3	1 Merrion Compound Land Limited Large Scale Residential Development of a Purpose-Built Student Accommodation to include the construction of 2 no. blocks, ranging in height from 1-6 storeys (over basement) and comprising 200 no. student bedspaces in total. www.gowanmotorscompoundlrd.ie Gowan Motors Compound, 169-177 Merrion Road, Dublin 4	1	20km	No	Development located east of Proposed Project. This development is hydrologically connected to the South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, North Dublin Bay SAC and Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
Kildare County Council	24116	Ardstone Homes Ltd Development will consist of 366 no. new residential development, a childcare facility, a new Link Road and all associated site works as per reference ABP-304632-19. Lands at Capdoo, Clane, Co. Kildare	1	1km	No	Development located south of Proposed Project. This development is hydrologically connected to the South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. Drinking water for this proposed development will originate in the Poulaphouca Reservoir SPA. The Proposed Project is not hydrologically connected to the Poulaphouca Reservoir SPA. No potential for in-combination effects.
Tipperary County Council	245	Arrabawn Co-Operative Society Limited A solar PV panel array consisting of up to 10,000 no. solar PV panels (c.27,010m2) on ground mounted steel frames on a c.6.33 hectare site, external transformer, power inverter units, underground cable ducts, perimeter security fence, CCTV masts, solar lighting and all associated works Knockanpierce, Nenagh, Co. Tipperary	1	5km	Yes	Development located east of Proposed Project. Potential downstream pathway via the Nenagh River to Lower River Shannon SAC and Lough Derg (Shannon) SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Fingal County Council	FW25A/0042E	Astellas Ireland Co Ltd. The installation of 10,400m2 of Photovoltaic (PV) Solar Panels. Astellas Ireland Co Ltd, Damastown Industrial Park, Dublin, D15 K851	1	15km	No	Development located north of Proposed Project. This development is hydrologically connected to the South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, North Dublin Bay SAC and Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
Clare County Council	2460612	Ballina Killaloe Sports & Community Facilities Development Co. (Clarisford) Ltd. To develop a swimming platform, and associated site works. Moys, Killaloe, Co. Clare	1	5km	Yes	Development located north of Proposed Project. This development is located within the Lower River Shannon SAC and is hydrologically connected to Lough Derg (Shannon) SPA and River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	19325	Banagher Chilling Limited Single storey extension to existing abattoir of 1061 square meters. In addition, the construction of a food processing factory of 4925 square meters and all associated siteworks Boheradurrow and Meenwaun, Banagher, Co. Offaly R42 HX24	1	10km	Yes	Development located north of Proposed Project. This development is hydrologically connected to River Shannon Callows SAC, Middle Shannon Callows SPA, River Little Brosna Callows SPA and Dovegrove Callows SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Kildare County Council	2560167	Blue Pine Solar 08 Limited Replacement of a single storey medium voltage substation previously permitted as part of a solar farm permission by Kildare County Council under Planning Ref. 20/1418 with a single storey 20kV substation at the site of the previously permitted substation. Kerdiffstown and Monread North, Naas, Co. Kildare	1	10km	No	Development located south of Proposed Project. Limited data available on this project in terms of potential likely significant effects that could occur during construction/operation. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
South Dublin County Council	LRD24A/0001	Bluemont Developments (Firhouse) Limited Demolition of all existing structures on site and construction of 100 no. residential units within 2 no. blocks ranging in height from 3-5 storeys. No. 2 Firhouse Road and the former Morton's The Firhouse Inn, Firhouse Road, Dublin 24	1	15km	No	Development located south-east of Proposed Project. This development is hydrologically connected to the South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA via the River Dodder. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
Limerick County Council	2460855	Board of Management Ardsoil Mhuire The demolition of the existing single storey school buildings (area 3,101m²) on site and the construction of an 8,387m² two and four storey 650 pupil post-primary school. The site is adjacent to the Lower Shannon SAC. Ardscoil Mhuire, College Park, Corbally	1	5km	Yes	Development located south of the Proposed Project. This development is located adjacent to the Lower River Shannon SAC and is hydrologically connected to River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	2560014	Bord na Móna Energy Ltd Recreational shared cycle and walkway located on Bord Na Móna lands. This will include the repurposing of 16,919 meters of existing former rail bed and 8,960 meters along existing bog headlands / former high fields. The proposed shared cycle and walkway will connect into the existing Grand Canal Greenway, The Offaly Way, and the Lough Boora Discovery Park. Bord Na Móna lands within the townlands of Cloncraff or Bloomhill Clonascra Ballyduff Clonaderg Doon Demesne Lackagh Beg Lackagh More, Cormore and Corbeg Corbane Ballydaly Kilcolgan Beg Turraun Leabeg Leamore Oughter Derrymore Bunakeeran, Lumcloon, Co. Offaly	1	10km	Yes	Development located north of the Proposed Project. This development is partially located within the Middle Shannon Callows SPA and is hydrologically connected to the River Shannon Callows SAC. It is also in the vicinity of the Slieve Bloom Mountains SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	20621	Bord Na Mona Energy Ltd The continued use of the previously permitted ash repository (An Bord Pleanála pl 19.216998 / Offaly County Council 05/1267) for deposition of up to 20,000 tonnes of peat ash and biomass ash during 2023. No new infrastructure is proposed as part of	1	5km	Yes	Development located south of the Proposed Project. This development is hydrologically connected to the River Barrow and River Nore SAC via the River Figile. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered

Authority	Application Reference	Description and Address	Tier	Distance in Relation to the Proposed Project	Source-Pathway-Receptor (Yes/No)	Potential for In-Combination Effects
		this application. The Existing Clonbullogue Ash Repository in the Townland of Cloncreen, Clonbullogue, Co. Offaly				
Offaly County Council	2560115	Bord Na Móna The development of a recreational shared cycle and walkway located on Bord Na Móna lands. This Planning Application is accompanied by a Natura Impact Statement (NIS) Bord Na Móna lands within the townlands of, Knockballyboy, Clonad, Rathfeston, Gorteenkeel, Island, Clonarrow or Riverlyons, Drumcaw or Mountlucas, Esker Beg, Killeen, Ballyhugh, Mullalough or Cavemount, Coole, Toberdaly, Newtown, Ballycon, Esker More, Colgagh, and Clongarret in County Offaly	1	0m	Yes	Development overlaps with the Proposed Project south of Daingean, Co. Offaly. This development is hydrologically connected to the Middle Shannon Callows SAC, River Shannon Callows SAC and River Barrow and River Nore SAC. It is also in the vicinity of the Slieve Bloom Mountains SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Laois County Council	2460545	Breedon Materials Limited (trading as Breedon Ireland) Continued use and extension to existing permitted sand and gravel pit within an overall application area of c. 12.2 hectares. Extraction of sand and gravel (dry working) over an area of c. 8 hectares with processing and washing of material on site and all ancillary works and structures; site facilities. The proposed extraction operational period is for 10 years plus 1 year to complete restoration. Mounthall and Cummer townlands, Camross, Co. Laois	1	15km	Yes	Development located south of the Proposed Project. This development is located adjacent to the Slieve Bloom Mountains SPA. It is also hydrologically connected to the River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Limerick County Council	2460334	Bridge Engineering Services Ltd New single storey office building, fabrication workshop with adjoining two storey mezzanine, a paint shed, a gas bottle storage cage, signage pylon, ESB sub-station and switch room and all associated site works. Bridge Engineering Services Ltd, Coolreiry & Woodpark, Castleconnell Co. Limerick	1	5km	Yes	Development located south of the Proposed Project. This development is hydrologically connected to the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	21134	Cadamstown Group Water Scheme Company Clg Construction of a 280 cubic meter water storage reservoir and all associated site works. Sheskin, Cadamstown, Birr, Co. Offaly	1	5km	Yes	Development located south of the Proposed Project. This development is located adjacent to the Slieve Blooms SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Kildare County Council	2461180	Cadamstown Solar Limited For a period of 10 years to construct and complete a solar PV Energy Development with a total site area of 173.3 hectares. The solar farm would be operational for 40 years. Townlands of Cadamstown, Ballina Clonuff and Garrisker, Co Kildare	1	10km	Yes	Development located north of the Proposed Project. This development is hydrologically connected to the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Kildare County Council	2560291	Cadamstown Solar Ltd Solar PV energy development with a total site area of 45.9 hectares, comprising of the construction of PV panels mounted on metal frames, transformer stations, GRP unit, internal access tracks, perimeter fencing with CCTV cameras and access gates, electrical cabling and ducting, temporary construction compound, landscaping and all ancillary infrastructure and associated works. The solar farm would be operational for 35 years. The export capacity to grid is estimated to be c. 35MW MEC. Townland of Kilglass, Co. Kildare	1	10km	Yes	Development located north of the Proposed Project. This development is hydrologically connected to the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
An Coimisiún Pleanála	313266	Cairn Homes Properties Limited 377 no. Build to Rent apartments, creche and associated site works. Former Blakes and Esmonde Motors Site, Lower Kilmacud Road, Stillorgan Road (N11) and The Hill, Stillorgan, Co. Dublin. (www.blakesshd.com)	1	20km	No	Development located south-east of the Proposed Project. This development is hydrologically connected to the South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
South Dublin County Council	SDZ24A/0029W	Cairn Homes Properties Limited 7 year planning permission for the construction of a mixed-use development, which includes 660 no. residential units comprising: • 264 no. semi-detached and terraced houses • 68 No. duplex apartment units arranged across 6 No. duplex blocks, ranging in height from 2 to 3 storeys; • 328 no. apartments arranged across 7 No. apartment blocks ranging in height from 4 to 6 storeys; • A creche (c. 615 sq. m) Development Area 9 Kishoge South East, Sub Sectors KSE-S1 and KSE-S2, Clonburris SDZ, within the townland of Kishoge, Clonburris, Dublin 22.	1	5km	No	Development located north-east of the Proposed Project. This development is hydrologically connected to the South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
An Coimisiún Pleanála	319500	Cairn Homes Properties Limited Large scale residential development: Construction of 119 houses, 12 apartments and all associated site works (newcastlesouthlrd2b.com) Within the townland of Newcastle South, Newcastle and along Athgoe Road & Hazelhatch Road (R405) to Ground Investigations Ireland premises, Newcastle, Co. Dublin.	1	1km	No	Development located south of the Proposed Project. This development is hydrologically connected to the South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
South Dublin County Council	SDZ23A/0043	Cairn Homes Properties Limited Mixed-use development arranged in 11 no. blocks, ranging between 3 & 7 storeys, comprising: 495 no. residential units, including 449 no. apartments arranged across Blocks A-F; 2,502 sq.m of retail floorspace; 483 sq.m creche; and 87 sq.m cafe. Development Area 6 Kishoge Urban Centre, sub sector KUC-S4 (including an area of Development Area, 9 Kishoge South East, sub sector KSE-S1), Clonburris SDZ, within the townland of Kishoge, Clonburris, Dublin 22.	1	5km	No	Development located north-east of the Proposed Project. This development is hydrologically connected to the South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
An Coimisiún Pleanála	321419	Capami Limited Seven-year planning permission for an LRD compromising of 523 residential units and all associated site works. NIS and EIAR as part of application. It can also be viewed on the LRD website (www.oldcourtlrd.ie). Bohernabreena, Oldcourt & Kilininny, Dublin 24.	1	10km	No	Development located south-east of the Proposed Project. Development located downstream with no connection to Proposed Project. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
South Dublin County Council	LRD24A/0007	Capami Ltd. 7 year planning permission for a Large Scale Residential Development (LRD) on a site measuring c.20.4Ha consisting of 523 no. residential units comprised of 255 no. 2, 3 & 4 bed, 2 & 3 storey, detached, semi-detached and terraced houses, 206 no. 1,	1	10km	No	Development located south-east of the Proposed Project. Development located downstream with no connection to Proposed Project. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.

Authority	Application Reference	Description and Address	Tier	Distance in Relation to the Proposed Project	Source-Pathway-Receptor (Yes/No)	Potential for In-Combination Effects
		2 & 3 bed duplex units in 20 no. 2 & 3 storey blocks, and 62 no. 1, 2 & 3 bed apartments in 7 no. 2-3 & 3-4 storey blocks (i.e. Blocks A, B2 & D, and 2 no. Blocks B1 & 2 no. Blocks C), along with a 2 storey childcare facility . Townlands of Bohernabreena, Oldcourt & Kilininny, Dublin 24.				
Clare County Council	2460416	Castlebank Green Energy Limited 10-year permission for a Solar Energy development with a total site area of 36.70 hectares. The Solar Farm would be operational for 40 years. The proposed grid route will connect the substation at the application site to the existing grid infrastructure at Ardnacrusha Power Station via a 38kV underground cable which is 1.2km in length (320m of which is on the local road L3056). Within the townlands of Castlebank Parteen Ballykeelaun and Drummin, Ardnacrusha, Co. Clare	1	1km	Yes	Development located south-west of the Proposed Project. This development is hydrologically connected to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	2560189	Clonarrow Windfarm Limited A 10-year planning permission for the erection of 4 wind turbines and 35-year operational life from the date of commissioning of the entire wind farm is being sought. The planning application will be accompanied by an Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS). Clonarrow or Riverlyons, and Killoneen, Co. Offaly.	1	0m	Yes	Development overlaps with the Proposed Project. This development is hydrologically connected to the River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
An Coimisiún Pleanála	320768	Codling Wind Park Limited Proposed development known as Codling Wind Park consisting of a generating station with wind turbine generators (WTGs) located in the maritime area, in the Irish Sea approximately 13-22 km off the County Wicklow coast. Located in the Irish Sea off the coast of County Wicklow (https://codlingwindparkplanningapplication.ie/).	1	20km	No	Development is a coastal project located east of the Proposed Project. This development is hydrologically connected to the South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
Meath County Council	2460348	Cpac Modular Limited Modular building manufacturing facility and ancillary development. Ballymurphy, Dunshaughlin, Co. Meath	1	20km	Yes	Development located north of the Proposed Project. This development is hydrologically connected to the Rye Water Valley/Carton SAC, River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
South Dublin County Council	SD25A/0135W	Data & Power Hub Services Ltd The development will consist of the omission of a permitted above ground installation (AGI) compound under Reg. Ref.: SD20A/0058, the provision of an AGI at an alternate location within the site, and the provision of a Pressure Reduction Metering System (PRMS) and a foul pumping station, along with road upgrades to the public road (R120 Peamount Road), and provision of a foul sewer connection from the site to the northeast, via Peamount Road and Old Nangor Road.The proposed development is located within a site subject to an application for an EPA Industrial Emissions (IE) Directive license. A site within the townlands of Miltown, Clutterland & Kilmactalway, on and adjacent Peamount Road (R120, and Old Nangor Road Newcastle, Co. Dublin.	1	1km	No	Development located east of the Proposed Project. This development is hydrologically connected to the North Dublin Bay SAC, South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
Offaly County Council	1925	Derryarkin Sand AND Gravel DAC An 87.6 hectare extension to the south-west, south and south-east of its existing sand and gravel pit; upgrading of the access road; new wheel wash facility; provision of mobile site office, mobile staff welfare unit and refuelling pavement slab; restoration of the proposed extension lands to naturally regenerated wildlife habitat, water ponds and potential long-term amenity use. Derrygreenagh, Knockdrin, Garr and Carrick Townlands, Rhode, Co Offaly	1	15km	Yes	Development located north of the Proposed Project. This development is hydrologically connected to the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Dublin City Council	WEB2472/24	Diageo Ireland Demolition and removal of the Old Keg Plant Building and Export Warehouse and construction of a two-storey Water Recovery Plant (WRP) Building, including the following external plant elements: External Equalisation Tank, 2 no. Biogas Scrubbers, 1 no. emergency flare,2 no. anaerobic treatment tanks and external odour control plant. Guiness Brewery, bounded by James's Street, Victoria Quay, Watling Street and Steevens Lane, Dublin 8.	1	15km	No	Development located east of the Proposed Project. This development is hydrologically connected to the South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
An Coimisiún Pleanála	320912	Dún Laoghaire-Rathdown County Council and the Land Development Agency Proposed development of 934 no. residential units, across 9 blocks, and 4,380 sqm of non-residential uses. Located on the former Central Mental Hospital, Dundrum Road, Dundrum, Dublin 14 and areas of Dundrum Road and St. Columbanus Road, Dublin 14.	1	20km	No	Development located south-east of the Proposed Project. This development is hydrologically connected to the North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
Kildare County Council	2560003	Dunform Properties Limited Construction of 133 no. residential dwellings, consisting of 20 no. 1-bedroom maisonettes, 4 no. 1-bedroom duplex units, 2 no. 2-bedroom duplex units, 6 no. 3-bedroom duplex units, 5 no. 2 bedroom bungalows, 37 no. 2-bedroom houses, 57 no. 3-bedroom houses, and 2 no. 4-bedroom houses. 3.43 ha site at Branganstown East Lands, Kilcock, Co. Kildare.	1	5km	Yes	Development located north of the Proposed Project. This development is hydrologically connected to the Rye Water Valley/Carton SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Kildare County Council	2460494	Eirgrid Plc. Construction of a new 220 kV Gas Insulated Switchgear (GIS) building; construction of a new 110kV GIS building; construction of 4 no. 220/110kV power transformers to include connections to the new GIS buildings; 2 no. 220kV and 1 no. 110kV line/cable interface towers and associated removal of 3 no. existing end masts and overhead line and cable works; 3 no. lightning masts (height 22m); cable connections to the 220kV GIS and 110kV buildings; new 4.5m wide internal access road and 10 no. new permanent car parking spaces; and cable connection for the existing Derryiron-Maynooth 110kV overhead line. Planning permission is sought for a period of 10 years. Maynooth 220kV Substation, Taghadoe and Windgates, Co. Kildare	1	5km	Yes	Development located north of the Proposed Project. This development is hydrologically connected to the Rye Water Valley/Carton SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Kildare County Council	2560302	Eirgrid Plc. Works associated with the proposed uprate of the existing 110 kV Overhead Line (OHL) between the existing Cushaling 110 kV substation in the townland of Ballykilleen, Co. Offaly and the existing Portlaoise 110 kV substation in the townlands of	1	250m	Yes	Development located north of the Proposed Project. This development is hydrologically connected to the River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.

Authority	Application Reference	Description and Address	Tier	Distance in Relation to the Proposed Project	Source-Pathway-Receptor (Yes/No)	Potential for In-Combination Effects
		Clonminam and Kylekiproe, Co. Laois. The Proposed Development works across the functional area of Co. Kildare will comprise replacement of the existing overhead line circuit conductor with a new higher capacity conductor including installation of a new fibre communication connection, replacement of 2 no. steel towers, replacement of steel members at 1 no. tower, replacement of wooden poles only at 8 no. locations, replacement of wooden poles and crossarm at 3 no. locations, replacement of crossarm at 4 no. locations, replacement of hardware and fittings. Coolelan Kiltaghan North Kiltaghan South Clonmoyle West Ummeras More Mountrice Mullaghroe Upper Mullaghroe Lower Coolatogher Coolsickin or Quinsborough and Coolnafearagh, Co. Kildare				
An Coimisiún Pleanála	319422	EirGrid East Meath – North Dublin Grid Upgrade. Proposed development of a 400 kV underground cable. Between the existing Woodland Substation, Batterstown, County Meath and the existing Belcamp Substation, Clonshaugh, Fingal, County Dublin.	1	15km	No	Development located north of the Proposed Project. This development is hydrologically connected to the South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
Offaly County Council	2560087	Eirgrid Uprate of the existing 110 kV Overhead Line (OHL) between the existing Cushaling 110 kV substation in the townland of Ballykilleen, Co. Offaly and the existing Portlaoise 110 kV substation in the townlands of Clonminam and Kylekiproe, Co. Laois. The Proposed Development works across the functional area of Co. Offaly will comprise replacement of the existing overhead line circuit conductor, replacement of the existing earthwire with new earthwire between structures 1 and 8; replacement of steel members at 3 no. towers, full tower painting required at 3 no. locations, replacement of wooden poles only at 7 no. locations, replacement of wooden poles and crossarm at 2 no. locations, replacement of crossarm only at 3 no. locations. Ballykilleen (Edenderry Rural Electoral Division) Kilcumber Cloncant Ballydermot Clonmel Clonbrown Clonroosk Little Clonroosk Big Coolygagan Clonbrock Upper Kilcloncorkry Kilnantoge Lower Kilnantoge Upper and Shean. , Co. Offaly	1	250m	Yes	Development located north of the Proposed Project. This development is hydrologically connected to the River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Limerick County Council	2461160	Eli Lilly (Kinsale) Limited The proposed development consists of extensions, modifications, alterations and new structures to previously permitted and partly built Biopharmaceutical Manufacturing Campus. The development consists of all site buildings and infrastructure required to support the new campus extension, including a 4-storey Biopharmaceutical Manufacturing Facility, extension to the previously permitted single storey Central Utilities Plant (CUP) Building extension to previously permitted single storey pedestrian link, extension to the north-west side of the previously permitted 2-storey canteen, laboratory and administration building, extension to the south-east side of the previously permitted 2-storey canteen, laboratory and administration building, additional 2-storey Central Utilities Plant (CUP) Building sized, with 4no. Boiler Stacks The IDA Business and Technology Park , Raheen , County Limerick.	1	15km	Yes	Development located south of the Proposed Project. This development is hydrologically connected to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	2460338	ENGIE Developments Ireland Limited Development of a c. 14MW solar photovoltaic (PV) farm at this 29.75ha site. The application seeks a 10-year permission with an operational lifetime of 35 years. The development will consist of approximately 38,000 panels on ground mounted metal frames,1 no. 38kV substation, 3 no. transformer units, Underground cabling and ducting. Townland of Clara, near Clara, Co. Offaly	1	20km	Yes	Development located north of the Proposed Project. This development is hydrologically connected to the River Shannon Callows SAC and Middle Shannon Callows SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Clare County Council	2460360	Engine Lease Finance Corporation 62 kW ground mounted Solar PV System and all associated site works Building 156 Shannon Free Zone, Shannon, Co. Clare V14 VH70	1	20km	No	Development located east of the Proposed Project. Limited data available on this project in terms of potential likely significant effects that could occur during construction/operation. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
An Coimisiún Pleanála	319506	Enva Ireland Limited Modifications to existing Waste Treatment Facility to manage 24,000 tonnes of Healthcare Risk Waste. 402 Grants Drive, Greenogue Business Park, Greenogue, Rathcoole, Co. Dublin	1	5km	No	Development located south of the Proposed Project. This development is hydrologically connected to the South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
Clare County Council	2549	ESB Telecoms Ltd Installation of solar panels on a steel frame structure to be erected over the roof of an existing telecommunication cabin (covering an area of approximately 48 sq.m to a maximum height of 4.8 metres above ground level). ESBs' Drumline 110kV Substation, Drumline, Shannon Co Clare	1	20km	No	Development located east of the Proposed Project. Limited data available on this project in terms of potential likely significant effects that could occur during construction/operation. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
Kildare County Council	2460657	EZ Living Interiors Ltd The proposed development primarily comprises the demolition of an existing car park and associated site clearance works and the construction of a distribution warehouse with ancillary office accommodation with a cumulative gross floor area (GFA) of c. 10,801 sqm. Greatconnell, Newbridge, Co. Kildare	1	20km	No	Development located south of the Proposed Project. This development is distant from and lacks hydrological connectivity with any European sites. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
An Coimisiún Pleanála	320727	FuturEnergy Knockshanvo Designated Activity Company Proposed development of 110kV underground electrical cabling from the proposed Knockshanvo Wind Farm development to the existing Ardnacrusha 110kV electrical substation and ancillary development.	1	250m	Yes	Development located west of the Proposed Project. This development is hydrologically connected to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.

Authority	Application Reference	Description and Address	Tier	Distance in Relation to the Proposed Project	Source-Pathway-Receptor (Yes/No)	Potential for In-Combination Effects
		Located in the townlands of Lakyle, Knockdonagh, Castlebank, Cloghera, Roo West, Drumsillagh or Sallybank (Merritt)(Parker), Glenon South, Trough and Ballykeelaun, County Clare.				
An Coimisiún Pleanála	320705	FuturEnergy Knockshanvo Designated Activity Company Proposed development of 9 no. wind turbines, 110kV substation and ancillary development. Located in the townlands of Snatty, Hurdlestown, Oatfield, Drumsillagh, Sallybank, Gortacullin, Aharinaghbeg, Knockshanvo, Cloontra, Cloghoolia, Ballycullen and others, County Clare. And Located in the townland of Court, County Limerick (https://knockshanvoplanning.ie/).	1	5km	Yes	Development located north of the Proposed Project. This development is hydrologically connected to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	20593	Galway Herb Farm Limited T/A Real Leaf Farm The construction of a greenhouse and ancillary buildings. Ballycon, Daingean, Co. Offaly, R35P7X6.	1	5km	Yes	Development located south of the Proposed Project. This development is hydrologically connected to the River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
An Coimisiún Pleanála	320738	GP Joule Ireland Limited Proposed development of 220kV 'Loop in' Substation, Battery Energy Storage System, Overhead lines, and associated works. Located in the townlands of Mulhussey & Kilclone, County Meath (https://theblackhallsubstationsid.ie/)	1	10km	Yes	Development located north of the Proposed Project. This development is hydrologically connected to the Rye Water Valley/Carton SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Kildare County Council	2460715	Green Urban Logistics Development Corporation Limited Construction of 1 no. warehousing/industrial/logistics building (approx. 18938 sqm total GFA and 16.8 in height) including ancillary office space, reception area, lobby, circulation areas, plant, tea stations, stores, WCs and shower facilities; The provision of 21 no. dock levellers and 4 no. doors on grade for loading and unloading of Heavy Goods Vehicles; The provision of 130 no. car parking spaces Site 34 Rowan Tree Road & Elm Road Momentum Logistics Park , Ladytown , Naas	1	20km	No	Development located south of the Proposed Project. This development is hydrologically connected to the South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
Limerick County Council	2560113	Groody Developments Limited Large-Scale Residential Development (LRD) - Purpose-Built Student Accommodation (PBSA) scheme consisting of 196 no. Bed Clusters, is distributed across 5 no. separate blocks, ranging in height from 5- 8 storeys, with a total of 1,400 no. student bedspaces to be delivered in two phases of development Groody Road, Newcastle Castletroy, Limerick	1	10km	Yes	Development located south of the Proposed Project. This development is hydrologically connected to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Kildare County Council	2468	Henry Yates Ground mounted solar panels with an overall area of 108.52 sq.m. The panels are to be grouped in three banks of 4.55m x 7.95m each and are to be located on the rear garden of the existing farm house, adjacent to the farm yard Coolaght Lodge, Kilmeague, Naas	1	10km	No	Development located south of the proposed Project. Limited data available on this project in terms of potential likely significant effects that could occur during construction/operation. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
Kildare County Council	2460787	Herbata Limited Data Centre and will comprise of: demolition of existing structures and construction of 6 no. two storey data centre buildings, each with loading bays, external plant area including electrical and mechanical plant rooms, fuel compound, sprinkler tanks and associated ancillary development. Townlands of Halverstown, Jigginstown and Newhall, Naas	1	15km	No	Development located south of the proposed Project. Limited data available on this project in terms of potential likely significant effects that could occur during construction/operation. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
An Coimisiún Pleanála	311528	Huntstown Power Company Ltd Construction of a 2 storey 220kV GIS substation known as 'Mooretown', 4 no. underground transmission cables and all associated and ancillary site development and construction works. Lands adjacent to Huntstown Power Station, North Road, Finglas, Dublin 11.	1	15km	No	Development located north-east of the Proposed Project. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
An Coimisiún Pleanála	312131	Irish Water Greater Dublin Drainage Project consisting of a new wastewater treatment plant, sludge hub centre, orbital sewer, outfall pipeline and regional biosolids storage facility. Townlands of Clonshagh, Dubber and Newtown, County Fingal and Dublin City	1	15km	No	Development located north-east of the Proposed Project. This development is hydrologically connected to the South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
Meath County Council	2460927	Irishtown Solar Farm Ltd. Install 33kV underground cabling and associated infrastructure required to connect Irishtown Solar Farm (Irishtown, Spricklestown, Ward Lower, Co. Dublin) to the grid via the existing Gallanstown 110kV substation on lands at Ballymacarney, The Ward, County Meath. Lands at Ballymacarney, The Ward, County Meath	1	20km	No	Development located north-east of the Proposed Project. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
Fingal County Council	FW24A/0433E	Irishtown Solar Farm Ltd. Install 33kV underground cabling and associated infrastructure required to connect Irishtown Solar Farm (permitted under Fingal County Council Reg. Ref. FW22A/0201) to the grid via the existing Gallanstown 110kV substation (Ballymacarney and part of Baytown, The Ward, County Meath). Irishtown, Spricklestown, Ward Lower, Co. Dublin.	1	20km	No	Development located north-east of the Proposed Project. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
Westmeath County Council	2560234	JH Kinnie Limited Large-Scale Residential Development which will comprise a residential scheme of 129 no. houses along with childcare facility. Lands at Boreen Bradach. The main development site is bounded by Boreen Bradach Road (L-5014)/Bun Daire estate to the east/north-east St Etchen's National School to the west and St Etchen's Court to the south, Kinnegad, Co. Westmeath.	1	20km	No	Development located north of the Proposed Project. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
Meath County Council	2460709	John Connaughton Limited a 10-year Planning Permission of a Large-Scale Residential Development. Construction of 853 no. residential units as follows: 1) 398 no. Apartment Units in 3 no. 1-6 storey blocks (A-C) 2) 112 no. Duplex Units in 6 no. 2-4 storey blocks (D-H) 3) 343 no. 1-3 storey houses Station Road (L2228) and Old Navan Road (R147), Dunboyne Co. Meath, townlands of Dunboyne Clonee Castle Farm and Loughsallagh	1	15km	No	Development located north of the Proposed Project. This development is hydrologically connected to the South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.

Authority	Application Reference	Description and Address	Tier	Distance in Relation to the Proposed Project	Source-Pathway-Receptor (Yes/No)	Potential for In-Combination Effects
Laois County Council	2560056	Kevin Flanagan Construction of an Enterprise & Employment Park to provide 5 no. serviced sites, on a site of 2.95ha. Townparks, Borris-in-Ossory, Co. Laois.	1	20km	Yes	Development located south of the Proposed Project. This development is hydrologically connected to the River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
An Coimisiún Pleanála	321383	Kildare County Council Proposed rehabilitation works on Pass Bridge. Passlands, Monasterevin, Co. Kildare	1	20km	Yes	Development located south of the Proposed Project. The River Barrow and River Nore SAC is within the ZoI of this development. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	21247	Kilmurray Pre-Cast Concrete LTDA 23-year permission for a 44.0 hectare extension to an existing authorised sand and gravel pit Derryarkin & Bunsallagh Townlands, Rhode, Co. Offaly	1	10km	Yes	Development located north of the Proposed Project. This development is hydrologically connected to the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	19478	Kilsaran Concrete (Trading As Kilsaran Build) Associated closed system silt storage lagoons and related ancillary buildings and facilities including the ready mix concrete batching plant, concrete block batching plant and block yard, asphalt plant, site office, prefabricated shipping office, wheel wash, weighbridge, electricity substation, single building, two bunded and covered fuel tanks, a concrete reclaimer and a septic tank with puraflo liquid effluent treatment system and the existing site entrance onto the n52 road; extension to the north and east of the existing sand and gravel pit over an area of 31.3 hectares. And all for a period of 18 years plus 2 years to complete restoration works (total duration of 20 years). Bunaterin, Claragh & Heath Townlands, Screggan, Tullamore, Co Offaly	1	10km	No	Development located north of the Proposed Project. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
Clare County Council	2560108	KPH Construction Large Scale Residential Development. The proposed development includes: (i) Demolition of existing ruinous house / shed structures; (ii) Construction of 101 no. residential units including 49 no. houses and 52 no. apartments comprising 28 no. one bed units; 24 no. two bed units; and 49 no. three bed units; Knockballynameath, Athlunkard, Co Clare	1	5km	Yes	Development located south of the Proposed Project. This development is hydrologically connected to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
South Dublin County Council	LRD25A/0003W	Lagan Homes Ballycullen Limited 502 no. residential units comprising 197no. 2 storey houses and 28 no. 3 and 4 storey simplex/duplex apartment blocks providing 305no. apartments. The proposed development also includes a crèche, public open space, car parking, bicycle parking, bicycle storage structures and lockers, bin stores, and 8no. ESB substations. Woodtown, Ballycullen, Dublin 16.	1	15km	No	Development located south-east of the Proposed Project. This development is hydrologically connected to the South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
An Coimisiún Pleanála	321772	Lens Media Ltd Construction of media park and all associated siteworks. Site located in the townlands of Coolscudden, Brownstown and Milltown, West of Grange Castle Business Park, Newcastle, Co. Dublin	1	500m	No	Development located north of the Proposed Project. This development is hydrologically connected to the South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
An Coimisiún Pleanála	JN91.312428	Limerick City and County Council New distributor road of approximately 680m in length with a cross-section consisting of 9.7m wide carriageway including a 3.5m wide bus lane, footpaths, segregated cycle track, planted verges with 1 in 2 road embankment side slopes, linking Golf Links Road (from Schoolhouse Road junction) with Groody Road at Kilbane Roundabout, Castletroy, Limerick	1	10km	Yes	Development located south of the Proposed Project. This development is hydrologically connected to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
An Coimisiún Pleanála	JP91.322037	Limerick City and County Council Proposed rehabilitation works on Park Road Bridge, between Canal Bank and Lower Park Road, Limerick.	1	10km	Yes	Limited information available online. Precautionary approach applied to assume potential pathways for effects due to proximity to the River Shannon and therefore the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Westmeath County Council	2560240	Lynx Developments Limited Large-scale residential development of 125 no. residential units (103 no. houses and 22 no. apartments) and a childcare facility. Killucan Road, Kinnegad, Co Westmeath	1	20km	No	Development located north of the Proposed Project. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
Fingal County Council	F24A/0324	M50 Skip Hire and Recycling Ltd. Construction of a lean-to extension, to the exterior of the existing Materials Recycling and Transfer Facility, this extension will increase the existing units gross floor area by 111.1 sq.m. Unit 8, Advance Business Park, Swords Rd, Santry, Co. Dublin.	1	20km	No	Development located north-east of the Proposed Project. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
Meath County Council	2460805	Marina Quarter Ltd. Large-Scale Residential Development consisting of 309 no. residential units comprising 169 no. dwelling houses and 140 no. apartments/duplexes providing a mix of 1, 2, 3 and 4-bed units. Principally located in Bennetstown (townland) to the west of the R157 and also extending into Pace & Dunboyne (townlands), Dunboyne North, Co. Meath	1	15km	No	Development located north of the Proposed Project. This development is hydrologically connected to the South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
Kildare County Council	2460497	Marshall Yards Development Company Limited Large Scale Residential Development comprising of the construction of 168 no. residential units, 1 no. creche, 1 no. ESB substation and all associated site development works including footpaths, cycle paths, parking, fencing, drainage, bicycle and bin stores, public lighting and landscaping/amenity areas. Shackleton Road, Ballymakealy Upper (Townland), Celbridge	1	5km	No	Development located north of the Proposed Project. This development is hydrologically connected to the South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.

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Limerick County Council	2460864	Mary Philomena & Mary Clancy Demolition of an existing shed and construction of a residential development comprising 15 no. residential units. Lower Park, Corbally, Limerick	1	5km	Yes	Development located south of the Proposed Project. This development is hydrologically connected to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
An Coimisiún Pleanála	317742	National Transport Authority Bus Connects Bray to City Centre. Bray to Dublin City Centre.	1	15km	No	Development located east and south-east of the Proposed Project. This development is hydrologically connected to the South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
An Coimisiún Pleanála	317660	National Transport Authority Bus Connects Kimmage to City Centre Core Bus Corridor Scheme. Kimmage, Dublin	1	15km	No	Development located east of the Proposed Project. This development is hydrologically connected to the South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
Offaly County Council	20237	Newleaf Energy LTD Development of a combined heat and power generating biomass gasification plant with integrated carbon capture and utilisation technology to provide renewable energy and electrical grid support services on a 2.45- hectare site. Coolcor, Rhode, Co Offaly	1	10km	Yes	Development located north of the Proposed Project. This development is hydrologically connected to the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	21488	OBM Solar Limited A 10-year permission for the construction of an extension to the permitted solar pv and battery storage development permitted under planning permission reference: 20/494. The extension will comprise additional solar panels on ground-mounted frames, 6 single storey electrical inverter/ transformer units. Greenhills, Rhode, Co. Offaly	1	10km	Yes	Development located north of the Proposed Project. This development is hydrologically connected to the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	20494	OBM Solar LTD A 10-year permission for the construction of a solar pv development on a c.132 ha site consisting of solar panels on ground-mounted frames, 27 no. Single storey electrical inverter/ transformer units, an enclosed battery energy storage system compound on a c.0.385 ha located within the solar pv development site consisting of 18 no. Battery storage units and all associated ancillary development works. Srah, Greenhills And Wood, Rhode, Co. Offaly	1	10km	Yes	Development located north of the Proposed Project. This development is hydrologically connected to the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	218	Offaly Solar Energy As Limited A 10 year planning permission for the construction of, and a 40 year operation and subsequent decommissioning of, a development consisting of a 52.75 hectare solar farm and battery energy storage system and 9.32 kilometre underground electricity grid connection (0.95 hectares). Townlands Of Derries, Lackan, Kilmurry, Derrygrogan Little, Derrygrogan Big, Wood Of O, Corndarragh, Derrynagall Or Ballydaly, Ardan And Puttaghan, Co. Offaly	1	10km	Yes	Development located north of Proposed Project. This development is hydrologically connected to River Shannon Callows SAC and Middle Shannon Callows SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Kildare County Council	24357	Oscar Dawn Limited Solar panel array consisting of up to c.94kWp (c.414m2) of solar panels fixed to metal frames and anchored to the ground, cable ducts and all associated works, as revised by Significant Further Information consisting of a Flood Risk Assessment and an Appropriate Assessment with Natura Impact Statement The Hazel Hotel, Skirteen, Monasterevin	1	20km	Yes	Development located south of the Proposed Project. The development is located adjacent to the River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Dublin City Council	PWSDZ3798/24	Pembroke Beach DAC The proposed development will consist of an office and mixed-use scheme comprising 2 No. blocks. Block A will range in height from 5-7 storeys over basement/undercroft carparking to include double height (UC-01 & 00 Level) ground floor reception, office, a restaurant/ bar, bakery/ café and event space with the upper floors to be used as offices. Block B will range in height from 5-12 storeys over basement/undercroft car parking. Former Irish Glass Bottle and Fabrizia Sites on Sean Moore Road, Dublin 4	1	20km	No	Development located east of the Proposed Project. The development has pathways to South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
Tipperary County Council	2560666	Phoenix Tower Ireland III Limited To retain the existing 24m telecommunications support structure carrying antenna and dishes, communications cabinets and associated site works within a palisade fenced compound previously granted under planning permission File Ref No. 11510391 AND, 2) Permission to install additional antenna, dish equipment to the support structure including ground equipment cabinets and associated site works. Knockanacree , Cloughjordan , Co. Tipperary	1	0m	No	Development overlaps with the Proposed Project. No pathways for effects identified between development and any European sites. No potential for in-combination effects.
Dublin City Council	LRD6057/24-S3A	Randalswood Construction Ltd Large-scale Residential Development that will consist of the demolition of all existing structures on site and the construction of a residential development of 102 no. apartments in 3 no. blocks, with a café/restaurant unit. Lands at 23-28 Prussia Street, Dublin 7 (D07X9X6, D07FW30 & D07PAF1)	1	15km	No	Development located east of the Proposed Project. The development has pathways to South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.

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Tipperary County Council	2460074	Renewable Energy Systems (RES) Ltd A 10-year planning permission to construct and complete a solar PV Energy Development with a total site area of c. 88.5 hectares comprising of solar PV ground mounted on support structures, inverter substations, 38kV substation, temporary construction compounds, electrical cabling and ducting, CCTV and other ancillary infrastructure. The solar farm would be operational for 40 years. Townlands of Kerane Fawnlough and Ballynaclough, Nenagh, Co. Tipperary	1	5km	Yes	Development located south and east of the Proposed Project. This development is hydrologically connected to the Lough Derg, North-east Shore SAC and the Lough Derg (Shannon) SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	2198	Renewable Energy Systems Limited A period of 5 years to construct and complete a solar pv energy development with a total site area of 60.53 hectares, to include a single storey electrical substation building, inverter substations, modules, solar pv ground mounted on support structures, a temporary construction compound, internal access tracks, security fencing, electrical cabling and ducting, cctv and other ancillary infrastructure. Ballyteige Little, Ballyteige Big and Colehill, Tullamore, Co. Offaly	1	10km	Yes	Development located north of the Proposed Project. This development is hydrologically connected to Charleville Wood SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	20238	Rhode Energy Storage LTD An energy storage facility on a 2.7-hectare site. The development will comprise: (i) an open area battery energy storage system (BESS) compound, 16 no. Medium voltage power station (MVPS) enclosures, (ii) synchronous condenser compound, controls building, associated bunded transformers and electrical plant, (iii) electrical substation containing customer building, Eirgrid building, and electrical plant and bunded transformer which will electrically connect the development to the existing derryion 110kv substation located on lands adjoining the site to the south , (iv) control building and (v) all ancillary development. Coolcor and Clonin, Rhode, Co. Offaly	1	10km	Yes	Development located north of the Proposed Project. This development is hydrologically connected to the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Limerick County Council	2460032	Riverpoint Construction ltd 99 no. residential units comprising of the following: 42 No. 2 storey, 3 bed, semi-detached units; 36 No. 2 storey, 4 bed, semi-detached units; 4 No.2 storey 4 bed detached units; 1 No. 2 storey, 3 bed detached unit and 2 no. blocks of 2 storey apartment units. Clonconane, Old Cratloe Road, Limerick	1	10km	Yes	Development located south-west of the Proposed Project. This development is hydrologically connected to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Clare County Council	2460414	Shannon Commercial Enterprises DAC Construction of two light industrial facilities with ancillary office space, yard spaces, refuse stores with carparking, bicycle parking, ESB substations, switch room and associated site works. Ballymurtagh, Shannon Free Zone West, Shannon Co. Clare	1	20km	Yes	Development located west of the Proposed Project. This development is hydrologically connected to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Limerick County Council	24320705	SID FuturEnergy Knockshanvo Designated Activity Company Proposed development of 9 no. wind turbines, 110kV substation and ancillary development located in the townlands of Snatty, Hurdlestown, Oatfield, Drumsillagh, Sallybank, Gortacullin, Aharinaghbeg, Knockshanvo, Cloontra, Cloghoolia, Ballycullen and others, County Clare. And located in the townland Court, Kildimo, Co. Limerick	1	20km	Yes	Development located south-west of the Proposed Project. The Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA are within the ZoI of this development. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Wicklow County Council	2460257	Solas Eireann Development Limited Solar PV energy development and grid route, with a total site area of 28 hectares comprising of the construction of PV panels mounted on metal frames, transformer stations, new access tracks, perimeter fencing with CCTV cameras and access gates, temporary construction compounds, 20 kV underground cabling connecting the solar farm to the existing Blessington 38kV ESB Substation, and all ancillary grid infrastructure and associated works. The solar farm would be operational for 35 years. Townlands of Threecastles Crosscoolharbour Santryhill Newpaddocks Oldpaddocks and Edmonstown, Blessington, County Wicklow	1	15km	Yes	Development located south of the Proposed Project. This development is hydrologically connected to the Poulaphouca Reservoir SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Meath County Council	2460742	Soleire Renewables Holdings Limited 10-year planning permission for the construction of, and a 40-year operation and subsequent decommissioning of, a development consisting of a 215 hectare solar farm (red line boundary), 28 electrical transformation enclosures, underground cabling. The townlands of Ballymacoll Little Boolies Nuttstown, Ballintry Belgree Rowan and Kinoristown , Co. Meath	1	15km	No	Development located north of the Proposed Project. The development is hydrologically connected to South Dublin Bay and River Tolka Estuary SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into the South Dublin Bay and River Tolka Estuary. This European site is located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
South Dublin County Council	SD179A24/0004	South Dublin County Council 118 Social residential homes and associated landscaped open space, roads and associated site works on South Dublin County Council (SDCC) land located off Lynch's Lane to the east of the R136 Outer Ring Road and south of Thomas Omer Way, Kishoge, Lucan, Dublin	1	5km	No	Development located north-east of the Proposed Project. There are no potential pathways from this development to any European sites. No pathways for effects identified between development and any European sites. No potential for in-combination effects.
An Coimisiún Pleanála	JH06S.322638	South Dublin County Council The development of 1,252no. residential units in a mix of houses, duplexes, triplexes and apartments; 2no. childcare facilities; 1no. community building; retail uses; refurbishment works to Grange House for future reuse. three sites referred to as Site 3, Site 4, and Site 5, located predominantly within the Kishoge Development Area of Clonburris Strategic Development Zone (SDZ), in the townlands of Kishoge, Esker South, Grange, and Balgaddy, Clonburris, County Dublin.	1	5km	No	Development located north-east of the Proposed Project. The development has pathways to South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
South Dublin County Council	SD25A/0101W	Starrus Eco Holdings Ltd A new hazardous medical waste processing facility, including a change of use of the existing building (Building B) on site from general waste disposal to hazardous medical waste processing. The demolition of the existing structures, construction of an extension to the existing building, the construction of a new building to the northwest of the site (Building A); The construction of a new 2 storey office building (c. 287 sqm) to the southeast of the site. Unit 14B, Grant's Way, Greenogue Business Park, Rathcoole, Co Dublin, D24 FV02	1	5km	No	Development located south of the Proposed Project. The development has pathways to South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.

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An Coimisiún Pleanála	318683	Starrus Eco Holdings Demolition of all existing waste processing buildings on site and construction of a new modernised multi-processing facility. Panda Waste, Ballymount Road Upper, Ballymount, Dublin 24	1	10km	No	Development located east of the Proposed Project. The development has pathways to South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
An Coimisiún Pleanála	321064	Statkraft Ireland 110kV Substation and Underground Grid Connection Located within the townland of Barranaghs, Garryhinch, Annamore in Co. Offaly & Forest Upper, Forest Lower, Coolnavarnoga, Coolaghy, Kilbride, Ballymorris, Cooltederry and Bracklone, Co. Laois (https://dernacartwindfarmsid.ie/).	1	10km	Yes	Development located south of the Proposed Project. This development is hydrologically connected to the River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	20476	Summit Solar LTD A 10-year permission for development which consists of the construction of a solar pv development comprising of ca. 105,000 no. Photovoltaic panels laid out in arrays, the construction of 38kv substation, a transformer unit and associated bund, along with ancillary development. Rathmount, Mullanafawnia, And Russellspenn, Co. Offaly	1	5km	Yes	Development located north of the Proposed Project. This development is hydrologically connected to River Shannon Callows SAC and Middle Shannon Callows SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	21622	Summit Solar Ltd A 10-year permission for the construction of a solar pv development comprising of ca.55,000 no. Photovoltaic panels laid out in arrays, along with ancillary development. Broughal and Drinagh, Co Offaly	1	10km	Yes	Development located north of the Proposed Project. This development is hydrologically connected to River Shannon Callows SAC and Middle Shannon Callows SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Fingal County Council	F23A/0740	Swords Road Investment Limited Demolition of existing 2 storey dwelling and construction of 13 no. warehousing units with ancillary office space within 5 no. two storey blocks with a combined floor area of 11,102sqm Lands at Carey House, Swords Road, Co. Dublin.	1	20km	No	Development located north-east of the Proposed Project. The development has pathways to South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
Limerick County Council	2461282	Tergnum Properties Ltd 139no. residential units along with the provision of a creche.www.mungretlrd.com Lands at Rathmale, Mungret, Limerick.	1	15km	Yes	Development located south-west of the Proposed Project. The Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA are within the ZoI of this development. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	2560258	The Committee of Daingean Naomh Mhuire CLG the construction of (1) a running track (2) carparking facilities (3) associated lighting (4) vehicular entrance from public road (5) temporary storage cabin and (6) any associated site works Gorteenkeel, Geashill, Co. Offaly	1	20m	No	Development located south of the Proposed Project. There are no potential pathways from this development to any European sites. No pathways for effects identified between development and any European sites. No potential for in-combination effects.
An Coimisiún Pleanála	321278	Transport Infrastructure Ireland Railway (Luas Finglas - Broombridge to Charlestown) Order [2024] 3.9km in length running from the existing Green Line terminus at Broombridge to a new terminus at Charlestown, Dublin.	1	15km	No	Development located north-east of the Proposed Project. The development has pathways to South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
Meath County Council	2460535	Uisce Éireann Construction of a new pumping station, flow splitting, dual cell aeration tank including dual anoxic zones, 2 No. new final settlement tanks, waste activated sludge (WAS) and return activated sludge (RAS) pumping stations, ferric sulphate dosing system including bunded chemical storage tank, control kiosk, sludge holding tank, solar PV panel installation capable of a maximum power generation of 10% of WwTP power requirements, influent & effluent site pipework to & from the proposed infrastructure, extension of the existing site roads to the proposed infrastructure, new flood protection wall. Longwood Waste Water Treatment Plant, Longwood, County Meath	1	15km	Yes	Development located north of the Proposed Project. This development is hydrologically connected to the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Tipperary County Council	2560151	Uisce Éireann Ground and roof mounted photovoltaic solar panels with a maximum actual square metreage of 175 m2 distributed over a grass area and flat roof on the treatment plant in combination with associated ancillary works. Water Treatment Works Newross, Newport, Co. Tipperary	1	5km	Yes	Development located south of the Proposed Project. This development is hydrologically connected to the Lower River Shannon SAC and the Slievefelim to Silvermines Mountains SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Tipperary County Council	2461086	Uisce Éireann Upgrade the existing Nenagh Wastewater Treatment Plant from its current design Population Equivalent (PE) of 12,000 to a PE plant of 22,000. The existing Wastewater Treatment Plant, Bulfin Road, Nenagh in the townland of Nenagh North.	1	5km	Yes	Development located west of the Proposed Project. This development is hydrologically connected to the Lower River Shannon SAC and Lough Derg (Shannon) SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	2138	Ummeras Wind Farm Limited Road / junction accommodation works to facilitate turbine deliveries associated with a proposed wind farm development in co. Kildare. A concurrent planning application is being lodged to Kildare county council in relation to a 10-year planning permission for a wind farm development which consists of 5 no. Wind turbines and associated infrastructure. Bracknagh, Ardra, Moanvane, Garrymona and Ballychristal, Co. Offaly	1	1km	Yes	Development located south of the Proposed Project. The River Barrow and River Nore SAC is within the ZoI of this development. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Dublin City Council	WEB2729/24	Ventaway Limited Demolition of the existing buildings and structures and construction of a building up to 14 storeys in height (61.05 metres above ground) over a double basement including office use, arts centre and café, auditorium, and ancillary uses. Site bound by City Quay to the north, Moss Street to the west & Gloucester Street South to the south, Dublin 2. The site includes 1-4 City Quay (D02 PC03), 5 City Quay and 23-25 Moss Street (D02 F854)	1	20km	No	Development located east of the Proposed Project. The development has pathways to South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European

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						sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
South Dublin County Council	LRD25A/0002W	Watfore Limited Demolition of existing commercial/industrial buildings on site and provision of a mixed use, residential and commercial/employment development within 4 no. blocks ranging in height from 6 to 10 storeys. The development will provide 436 no. apartments; creche, and 4 no. commercial/employment units. Units 16-21A-B, Parkmore Industrial Estate, Longmile Road, Walkinstown, Dublin 12	1	10km	No	Development located east of the Proposed Project. The development has pathways to South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
Offaly County Council	2460250	William Grant And Sons Irish Manufacturing Ltd. Solar PV development with an installed capacity of up to 2.6 MWdc to provide electrical power to the existing distillery comprising approximately 4,100 no. photovoltaic panels on ground mounted frames within a site area of 3.90 hectares and associated ancillary development. Tullamore Distillery Campus Ballard & Clonminch, Tullamore, Co. Offaly	1	10km	No	Development located north of the Proposed Project. No pathways for effects identified between development and any European sites. No potential for in-combination effects.
Offaly County Council	21701	Zoetis Belgium S.A. (IRISH BRANCH) A single storey biopharmaceutical manufacturing building sized approximately 8,510 square metres. Unit 5, Sragh Technology Park, Rahan Road, Srah, Tullamore, Co. Offaly.	1	10km	No	Development located north of the Proposed Project. No pathways for effects identified between development and any European sites. No potential for in-combination effects.
Offaly County Council	16177	Anthony Cocoman Infilling of lands with material consisting of clean, uncontaminated soil and stones and for the crushing of concrete on a sporadic basis. Shean, Edenderry, Co. Offaly	1	0m to 20m	Yes	Development is located directly adjacent to the Proposed Project and overlaps in one area (TWD – 3500). It is adjacent to the Figile_030 watercourse. Downstream pathway to River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Kildare County Council	23837	Carbury Compost Unlimited The construction of a photovoltaic solar farm comprising of 54 no. table solar panel arrays erected on ground mounted galvanised steel frames/support structures. Monaghan Mushrooms, Drummin, Derrinturn, Carbury, Co Kildare	1	0m to 20m	Yes	Development located directly adjacent to Proposed Project (Monaghan Mushrooms south of Carbury, County Kildare. Potential impact to the River Barrow and River Nore SAC and Rye Water Valley/Carton SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Kildare County Council	201581	Carbury Compost Construction of a single storey mono-pitch roof staff training room (67.6 sqm) directly accessible from the wider Monaghan Mushrooms facility campus; and all ancillary site works necessary to facilitate the development. Drummin, Carbury, Co. Kildare	1	0m to 20m	Yes	Development located directly adjacent to the Proposed Project (Monaghan Mushrooms south of Carbury, County Kildare). Hydrological pathway to the River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Clare County Council	22591	Eddie Brady 10-year planning permission for a solar array. at Ballyglass, Coolderry, Dromintobin North, Reanabrone, and Oakfield (townlands) Ardnacrusha, Co Clare.	1	0m to 20m	Yes	Townlands for the solar development overlap with the 38 kV Uprate. Pathway to the Lower River Shannon SAC (downstream pathway). Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
An Bord Pleánala	316372	EirGrid' Kildare-Meath Grid Upgrade' - Proposed development of a 400 kV underground cable between Dunstown 400 kV substation and Woodland 400 kV substation. Townlands of Dunstown, Co. Kildare and Woodland, Co. Meath	1	0m to 20m	Yes	This development crosses the Proposed Project at R407 near the townlands Baltracey and Ballyloughan, County Kildare (road to Kilcock). It crosses watercourses that lead downstream to the Rye Water Valley/Carton SAC and has ecological connectivity to the River Boyne and River Blackwater SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	21598	Kilcush Solar Farm Ltd A period of 10 years to construct a solar PV development with a total site area of 117.47 hectares. Ballinowlart North, Ballykilleen, Kilcumber, Cloncant and Cushaling, Edenderry, Co. Offaly	1	0m to 20m	Yes	Development is Kilcush Solar Farm (adjacent to Cushaling Wind Farm). South of Edenderry (near Edenderry Power Station), adjacent to Proposed Project and adjacent to the River Figile which is crossed by the Proposed Project. This development has a downstream pathway to the River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	20331	Bord na Móna Energy Ltd Croghan Biomass Facility. For the storage and seasoning of biomass logs followed by chipping of the seasoned logs. Esker Beg and Drumcaw, or Mountlucas, Co. Offaly	1	20m to 250m	Yes	Development located adjacent to the Proposed Project. Existing BnM facility. Adjacent to the Daingean_030 watercourse which flows downstream to the River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Kildare County Council	21455	Carl Farrar A bridge over the River Liffey to facilitate farming. Friarstown, Straffan, Co. Kildare	1	20m to 250m	Yes	Development crosses the Liffey_140 watercourse approximately 900m downstream of where the Proposed Project crosses this watercourse. Instream works proposed and downstream pathway to the Rye Water Valley/Carton SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
An Bord Pleanala	316119	Coras Iompair Eireann DART+ South West Electrified Heavy Railway Order – Hazelhatch & Celbridge Station to Heuston Station, and Heuston Station to Glasnevin County Dublin and County Kildare	1	20m to 250m	No	Development located north of the Proposed Project, along existing railway infrastructure. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
South Dublin County Council	SD23A/0012	Data & Power Hub Services Limited Battery Energy System Storage (BESS) and Power Trunk building. Within the townland of Milltown, located to the north of Peamount Road (R120) & Peamount Lane, Newcastle, Co. Dublin	1	20m to 250m	No	Development situated adjacent to the Proposed Project TPR; however, no connectivity to any European sites. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
An Bord Pleanala	318505	Futurenergy Carrownagowan DAC Proposed construction of a 110kV underground grid connection cable connecting the permitted Carrownagowan windfarm to the existing 110kV substation at Ardnacrusha. Within the townlands of Caherhurly, Killokennedy. Cloongaheen West, Leitrim, Castlebank, Ballykeelaun, County Clare.	1	20m to 250m	No	This development is located to the south and north of 38 kV Uprate (near Ardnacrusha). There is a downstream connection to the Lower River Shannon SAC. However, the Appropriate Assessment for this development ruled out the potential for any likely significant effects on this European site. No pathway for effects identified between development and Proposed Project. No potential for in-combination effects.
Kildare County Council	21114	Harmony Solar Smithstown Limited Amend the design of the approved development (Kildare County Council Planning Reg Ref 17/535) which comprises consent for the development of a solar photovoltaic panel array. Smithstown and Roosk, Co. Kildare	1	20m to 250m	No	Development located in close proximity to Proposed Project (approximately 200m); however, no potential for impacts to any European sites (no pathways) identified. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
Tipperary County Council	2260559	Michael Quigley Construction of a livestock underpass, effluent holding tank and all associated site works. Ballyanny Lower, Nenagh, Co. Tipperary	1	20m to 250m	No	Development situated approximately 200m south of Proposed Project; however, no connectivity to any European sites. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
Tipperary County Council	211327	Caroline and John Rice Tourism visitor facility and associated retail, cafe and visitor facilities. Former Creamery, Birdhill, Co Tipperary	1	250m to 500m	No	Community development (tourism facility; south of proposed 38 kV Uprate). No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.

Authority	Application Reference	Description and Address	Tier	Distance in Relation to the Proposed Project	Source-Pathway-Receptor (Yes/No)	Potential for In-Combination Effects
Offaly County Council	21291	Edenderry Power Limited Development at Edenderry Power Plant Ballykilleen, Edenderry, Co. Offaly	1	250m to 500m	No	Development is in relation to the existing Edenderry Power Plant. Increase in biomass consumption is proposed but no change to any infrastructure. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
Clare County Council	2360249	Harmony Solar Clare Ltd. Solar farm and 38 kV electrical substation. Land to the west/north-west of Ardnacrusha within the townlands of Castlebank Drummin, Glenlon North Glenlon South and Ballykeelaun, Co Clare	1	250m to 500m	Yes	Development located west of the proposed 38 kV Uprate, north of Ardnacrusha. Waterbodies within the development site have a downstream pathway to the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
South Dublin County Council	SD24A/0087W	Lens Media Ltd 6 no. Stage buildings comprising 11 no. Internal sound stages. Site located in the townlands of Coolscudden, Brownstown and Milltown, West of Grange Castle Business Park, Newcastle, Co. Dublin	1	250m to 500m	No	Development situated north of Proposed Project TPR; however, no connectivity to any European sites. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
Offaly County Council	20218	Moanvane Wind Farm Limited Laying an underground electricity cable of up to 110kV and associated ducting and ancillary development. Primarily within the public road in the townlands of Rathfeston, Ballykean, Ballyduff, Raheenbeg, Kilcooney, Ballintogher, Gorteenkeel and Balltnakill, Co. Offaly	1	500m to 600m	Yes	Development is located south of the Proposed Project. Potential downstream pathway to River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Offaly County Council	19496	Bord na Móna Plc Alterations to existing 110kV Cushaling Substation and includes the instillation of 110 kV AIS Switchgear. Ballykilleen, Edenderry, Co. Offaly	1	600m to 1km	No	Development is an upgrade to an existing substation (part of Cushaling Wind Farm). No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
Offaly County Council	2152	Bord na Móna Powergen Ltd 10-year planning permission for a modular battery energy storage system (BESS) facility. Ballykilleen, Co. Offaly	1	600m to 1km	Yes	Development is part of the Cloncreen Wind Farm (southwest of Cushaling). Downstream connection to the River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
An Bord Pleanala	309686	Cloncant Renewable Energy Ltd Application for a ten-year permission for a 110kV Air Insulated Switchgear (AIS) Loop Substation with 400m long overhead line grid connection and all associated site works. In the townlands of Ballykilleen, Cloncreen and Ballinowlart North, Co. Offaly	1	600m to 1km	Yes	South of Edenderry (near Edenderry power station), downstream of the Proposed Project and adjacent to the River Figile which is crossed by the Proposed Project. This development leads downstream to the River Barrow and River Nore SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
Clare County Council	211232	Electricity Supply Board Upgrading works to the electricity network Ardnacrusha Generating Station, Castlebank, Ardnacrusha, Co. Clare	1	600m to 1km	No	Development is located downstream of the proposed 38 kV Uprate, within the existing Ardnacrusha site. Exempt development. Upgrade to electricity network. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
An Bord Pleanala	318782	Ørsted Onshore Ireland Midco Limited Windfarm and Ancillary Infrastructure Townlands of Ballycr (North), Belvoir, Cloghera, Cloonsheerea, Cloontra, Cloontra East, Cloontra West, Crag, Derrynaveagh, Derryvinnan, Drumsillagh, Sallybank (Merrit), Droomsillagh or Sallybank (Parker), Gortacullin, Knockbrack Lower, Knockshanvo, Kyle, Mountrice, Oatfield and Snaty, Co.Clare	1	600m to 1km	Yes	Development is located approximately 2.5km northwest, at the closest point, from the Proposed Project. There is downstream connectivity to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
N/A	N/A	Uisce Éireann National Leakage Reduction Programme. Ireland	1	Various	Yes	Various developments located nationwide. Precautionary to assume there is a source-pathway-receptor, therefore potential for in-combination effects to be considered.
N/A	N/A	National Transport Authority Cycle Connects. Improving the cycle network within towns across Ireland.	2	600m to 1km at closest point	Yes	Limited information available on routes at this early stage of the development. Precautionary approach applied to assume potential pathways for effects due to watercourses with hydrological pathways to European sites. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
N/A	N/A	Donore Project (St. Teresa's Gardens) St. Teresa's Gardens was a 1950's local authority apartment complex of 346 apartments/flats across 12 blocks and 10 terrace houses. In 2010, Dublin City Council in partnership with the Department, St. Teresa's Gardens Regeneration Board and the residents of St. Teresa's Gardens commenced planning for regeneration. Part 10 Planning application was approved in June 2023 which will see the delivery of 154 Social Housing units and 389 LDA Cost Rental units. Construction and delivery will take place on a phased basis from 2024-2028. 54 social homes were delivered in 2020 as part of the St. Teresa's Gardens Margaret Kennedy Road Project.	2	13km	No	Residential development located downstream with no connection to Proposed Project. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
N/A	N/A	Bluebell Lands LDA will deliver 410 homes as part of a mixed tenure development in partnership with Dublin City Council. The tenure split will be as follows: 140 social and 270 cost rental.	2	8.5km	No	Residential development located downstream with no connection to Proposed Project. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
N/A	N/A	Constitution Hill Dublin 7 Regeneration proposal to provide 130 Social Housing Units	2	14.5km	No	Residential development located downstream with no connection to Proposed Project. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
N/A	N/A	Lands at Emmet Road The development consists of 578 homes, a Community Hub Library, Crèche, Supermarket, Retail Units, associated public realm and landscape works, and a series of new public open spaces to create a vibrant new neighbourhood in Inchicore with a rich diversity of residents supported and sustained by a mix of uses and facilities. As a mixed tenure development, the Emmet Road project will provide 137 social housing units and 441 cost rental units.	2	11km	No	Residential development located downstream with no connection to Proposed Project. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
N/A	N/A	M20 Cork to Limerick The scheme consists of the development of a high-quality route connecting Cork to Limerick	2	16.5km	Yes	Development located southwest of Proposed Project. There is no hydrological connection between the M20 motorway and the Proposed Project, which is located upstream of the M20 motorway and in a different catchment. However, this development will cross the Maigue River, which flows into the River Shannon Estuary (and associated European sites i.e. Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA) which is also connected to the Proposed Project (via River Shannon). Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
N/A	N/A	N21/N69 Limerick to Adare to Foynes The project consists of 16km road from Foynes to Rathkeale with a single carriageway link road to the existing N69 at Askeaton and 16Km motorway from Rathkeale to Attyflin, east of Adare (incorporating the Adare Bypass).	2	8km	Yes	Development located southwest of Proposed Project. There is no hydrological connection between the Foynes to Limerick Road (including the Adare Bypass) and the Proposed Project, which is located upstream of the Foynes to Limerick Road and in a different catchment. However, this development will cross a number of watercourses including the Maigue River and Deel [Newcastlewest], which flows into River Shannon Estuary (and associated European sites i.e. Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA) which is connected to the Proposed Project (via River Shannon). Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.

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N/A	N/A	Limerick to Scarriff Greenway The proposed 40Km Greenway envisages a greenway that would begin in Limerick City and travel as far as Scarriff Harbour, passing close to the Errina Canal and River Blackwater, with connections to nearby villages and towns such as Cloonlara, O'Briensbridge, Killaloe, Ogonolloe	2	0km	Yes	Development is located west of and crosses the proposed 38 kV Uprate. The Proposed Project is hydrologically connected via Lough Derg and the River Shannon, as well as the 38 kV Uprate works intersecting with this development. There are also potential impacts on Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
N/A	N/A	MetroLink The MetroLink project is the development of a north-south urban railway service that will run between Swords and Charlemont, connecting key destinations including Dublin Airport and the City Centre along the 19km route. There will be a total of 15 new stations, 3,000 additional Park and Ride spaces, and a journey time of approximately 25 minutes from Swords to City Centre.	2	13km	No	Development located east of Proposed Project. The Proposed Project is not hydrologically connected to this development. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
N/A	N/A	Luas Lucan This project is proposed to develop a light rail line from Lucan to the City Centre, supplementing and complementing the planned bus system, to serve the overall public transport needs in this area.	2	4.5km	No	Small-scale development with limited information available. Development is located downstream of the Proposed Project. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
N/A	N/A	Velodrome and National Badminton Centre A 250 metre cycling track, up to 12 Badminton Courts in the in-track area, spectator seating and ancillary facilities including office space.	2	10km	No	Development area within existing urban area/sports grounds. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
N/A	N/A	King's Island Flood Relief Scheme This project is a flood relief scheme for Kings Island, Limerick	2	5km	Yes	Development located south of Proposed Project. Potential downstream pathway via the River Shannon. Potential impact on Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
N/A	N/A	Limerick Flood Relief Scheme This project is a flood relief scheme for Limerick	2	2km	Yes	Development located south of the Proposed Project. The Proposed Project is hydrologically connected to the River Shannon and associated European sites i.e. Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
N/A	N/A	Shannon Flood Relief Scheme This project will deliver a new Flood Relief Scheme for Shannon, Co Clare	2	18km	Yes	Development located west of Proposed Project. There is no hydrological connection between the Shannon Flood Relief Scheme and the Proposed Project, which is located upstream of the development and in a different catchment. However, this development is connected to the River Shannon Estuary (and associated European sites i.e. Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA) which is also connected to the Proposed Project (via River Shannon). Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
N/A	N/A	Electricity Transmission Network: Capital Project 966 Proposed electricity infrastructure project to strengthen the electricity network between the Dunstown substation in Kildare and the Woodland station in Meath. Capital Project 966 is a proposed development that will help transfer electricity to the east of the country and distribute it within the network in Meath, Kildare and Dublin. The project will help to meet growing demand for electricity in the east of the country (Meath, Kildare, Dublin) and integrate generation in the West and South West.	2	0km	Yes	Development located north and south and will cross a section of the Proposed Project. There is a potential hydrological connection between this development and the Rye Water Valley/Carton SAC and the River Boyne and Blackwater SAC. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.
N/A	N/A	Greater Dublin Drainage The Greater Dublin Drainage (GDD) project will develop a new regional wastewater treatment facility and associated infrastructure to serve Dublin and parts of the surrounding counties of Kildare and Meath. GDD represents the next major step in the development of the wastewater treatment infrastructure in greater Dublin, recognising its continued growth. GDD will provide capacity to treat wastewater for up to half a million people in north county Dublin and parts of Kildare and Meath.	2	14km	No	Development located in the Dublin area to serve the wastewater needs of existing and future drainage catchments in the north, west and north-west of the Dublin agglomeration. This development is located downstream of the Proposed Project and is hydrologically connected to the South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, North Dublin Bay SAC and Bull Island SPA. However, in the case of the Proposed Project, a reasonable worst-case ZoI for water pollution is considered to not extend beyond the first water body of depositional nature (e.g. transitional water body). Thus, even in an extreme worst-case scenario, it is considered there is no potential for impacts beyond the Liffey Estuary Lower and into these aforementioned European sites. These European sites are located beyond the ZoI and therefore there are no pathways for effects associated with the Proposed Project. No potential for in-combination effects.
N/A	N/A	Dodder Valley Sewer Reinforcement This project provides for the implementation of the measures identified from the Drainage Area Plan to address the highest priority risks namely storm water overflows to the River Dodder and sewer flooding from the Dodder Valley Sewer which is a strategic sewer within the Ringsend agglomeration. The Dodder Valley Sewer is a foul sewer however it conveys significant storm flows in response to rainfall and these flows have increased over time due to increased impermeable area being connected to the network, primarily through misconnections. In order to provide for growth and future development measures will be required including reinforcement works on the Dodder Valley Sewer to manage storm flows.	2	10km	No	Development located approximately 25km south-east of Proposed Project. The Proposed Project is not hydrologically connected and is in a separate catchment to the Dodder Valley Sewer Reinforcement. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
N/A	N/A	Lower Liffey Valley The primary objective is to focus on storm water overflow compliance and provide for growth.	2	10km	No	Limited data available on the Lower Liffey Valley development in terms of potential likely significant effects that could occur during construction/operation. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
N/A	N/A	Maynooth Transfer Pipeline Provision for increase in pass forward flow transfer capacity between Maynooth and Leixlip Wastewater Treatment Plant to protect environment and facilitate growth. To eliminate existing flows from Maynooth being pumped through an overloaded network in Leixlip.	2	5km	No	Development located north of Proposed Project. The Proposed Project is not hydrologically connected to this development. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
N/A	N/A	Poolbeg West Strategic Development Zone Wastewater Network Infrastructure extension to facilitate housing development in the high growth area of Poolbeg Strategic Development Zone. The purpose of the project is to facilitate the development of housing	2	17km	No	Limited data available on this project in terms of potential likely significant effects that could occur during construction/operation. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
N/A	N/A	Grand Canal Tunnel Sewer Outfall Extension The proposed project involves the extension of the storm water outfall from the Grand Canal Dock to the River Liffey and removal of the outfall discharge. The project will be jointly delivered by Uisce Éireann and Dublin City Council (DCC).	2	16km	No	Limited data available on this project in terms of potential likely significant effects that could occur during construction/operation. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.
N/A	N/A	Castletroy Wastewater Treatment Plant This project is to deliver a scheme that caters for future growth and ensures compliance with the UWWTD and with WWDA requirements.	2	6km	Yes	Development located south of Proposed Project. Potential downstream pathway via River Shannon. Potential impacts on Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Source-pathway-receptor identified, therefore potential for in-combination effects to be considered.

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N/A	N/A	Elective Capacity Dublin Program to develop new Elective Hospitals and Surgical Hubs in Dublin to increase the provision of planned, non-emergency medical procedures, thereby reducing waiting lists and freeing up capacity in existing hospitals. The Elective Hospitals Programme aims to provide significant additional capacity, estimated at over 977,700 procedures annually nationwide, with Dublin sites at Connolly Hospital and the Children's Hospital site in Crumlin being planned for development. In the shorter term, the HSE is progressing two new Surgical Hubs in Dublin (Swords and Mt Carmel) to provide immediate increases in day case surgery and outpatient capacity.	2	N/A	No	Limited data available on this project in terms of potential likely significant effects that could occur during construction/operation. No pathways for effects identified between development and Proposed Project. No potential for in-combination effects.

Note: — = no data and NA = non-applicable. Cells highlighted grey are projects that have screened in and are considered to have potential for in-combination effects with the Proposed Project.