

Environmental Impact Assessment Report (EIAR)

Volume 3 of 6: Environmental Assessment

(Chapter 8) Biodiversity

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Acronyms and Abbreviations

Acronym	Full name
AADT	Annual Average Daily Traffic
BCIreland	Bat Conservation Ireland
BCT	Bat Conservation Trust
BoCCI	Birds of Conservation Concern in Ireland
BSBI	Botanical Society of Britain and Ireland
BPT	Break Pressure Tank
BPS	Booster Pumping Station
BTO	British Trust for Ornithology
BWI	BirdWatch Ireland
CC	Construction Compound
CEMP	Construction Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CIRIA	Construction Industry Research and Information Association
CL	Conservation Limit
CSZ	Core Sustenance Zone
DAFM	Department of Agriculture Food and Marine
DAISIE	Delivering Alien Invasive Species Inventories for Europe
dB	Decibel
DEHLG	Department of Environment, Heritage and Local Government
DHPCLG	Department of Housing, Planning, Community and Local Government
DHPLG	Department of Housing, Planning and Local Government
DHLGH	Department of Housing, Local Government and Heritage
EC	European Community
ECoW	Ecological Clerk of Works
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
ESB	Electricity Supply Board
ESBN	Electricity Supply Board Networks
EU	European Union
FCV	Flow Control Valve
FPO	Flora Protection Order
GDA WRZ	Greater Dublin Area Water Resource Zone
GIS	Geographic Information System
GPS	Global Positioning System
GWB	Groundwater Body
GWDTE	Groundwater dependent terrestrial ecosystem
HDV	Heavy Duty Vehicle
HLPS	High Lift Pumping Station
HMWB	Heavily Modified Water Body
IAQM	Institute of Air Quality Management
ICARUS	Irish Climate Analysis and Research UnitS
IFI	Inland Fisheries Ireland

Acronym	Full name
INNS	Invasive Species
ITM	Irish Transverse Mercator
IUCN	International Union for Conservation of Nature
I-WEBS	Irish Wetland Bird Surveys
KER	Key Ecological Receptor
LED	Light Emitting Diode
LiDAR	Light Detection and Ranging
ML/d	Million litres per day
NBDC	National Biodiversity Data Centre
NHA	Natural Heritage Area
NIEA	Northern Ireland Environment Agency
NIS	Natura Impact Statement
NPWS	National Parks & Wildlife Service
NRA	National Roads Authority
OHL	Overhead line
OPW	Office of Public Works
OWP	Options Working Paper
PBR	Potential Bat Roost
PM	Particulate Matter
PNR	Project Need Report
PPV	Peak Particle Velocity
PRF	Potential Roosting Feature
PSD	Pipe Storage Depot
pNHA	proposed Natural Heritage Area
POAR	Preliminary Options Appraisal Report
PV	Photovoltaic
PWWC	Passive Wedge-wire Cylinder
QI	Qualifying Interest
RAT	Rapid Assessment Technique
RBMP	River Basin Management Plan
RHAT	River Hydromorphology Assessment Technique
ROI	Republic of Ireland
RPA	Root Protection Area
RSPB	Royal Society for the Protection of Birds
RWI&PS	Raw Water Intake and Pumping Station
RWI	Raw Water Intake
RWRM	Raw Water Rising Main
SAC	Special Area of Conservation
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SuDS	Sustainable Drainage System
SWMP	Surface Water Management Plan
TII	Transport Infrastructure Ireland
TPR	Termination Point Reservoir

Acronym	Full name
TSS	Total Suspended Solids
UK	United Kingdom
UV	Ultraviolet
VOCs	Volatile Organic Compounds
VP	Vantage Point
WFD	Water Framework Directive
WTP	Water Treatment Plant
WwTP	Wastewater Treatment Plant
ZoI	Zone of Influence

8. Biodiversity

8.1 Introduction

1. This chapter reports the assessment of the likely significant effects of the Proposed Project on biodiversity during the Construction Phase and Operational Phase, in accordance with the requirements of the EIA Directive. This chapter describes and assesses the likely direct and indirect significant effects of the Proposed Project on biodiversity, including interactions between flora and fauna, with particular attention to species and habitats protected under Directive 92/43/EEC (Habitats Directive) and Directive 2009/147/EC (Birds Directive).
2. The Convention on Biological Diversity¹ defines biodiversity as '*the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems*'. The term 'flora and fauna' is used to refer to the native and invasive non-native plants and animals, respectively of a geographical region. Both are collective terms, referring to groups of plants (their communities or habitats) and animals specific to a region or a period of time. In addition to geographical groupings, their environment, such as aquatic or terrestrial, also helps further their classification.
3. Table 8.1 provides a summary of the principal project infrastructure. A full description is provided in Chapter 4 (Proposed Project Description), of this Environmental Impact Assessment Report (EIAR). Details on the outline phasing of the works are provided in Chapter 5 (Construction & Commissioning).

Table 8.1: Summary of Principal Project Infrastructure

Proposed Project Infrastructure	Outline Description of Proposed Project Infrastructure*
Permanent Infrastructure	
Raw Water Intake and Pumping Station (RWI&PS) (Infrastructure Site) County Tipperary	• The RWI&PS would be located on a permanent site of approximately 4ha on the eastern shore of Parteen Basin in the townland of Garrynatineel, County Tipperary. In addition, approximately 1ha of land would be required on a temporary basis during construction. • The RWI&PS has been designed to abstract enough raw water from the River Shannon at Parteen Basin to provide up to 300Mld of treated water by 2050. • The RWI&PS site would include a bankside Inlet Chamber, the Raw Water Pumping Station Building, two Microfiltration Buildings, an Electricity Substation and Power Distribution Building, and Dewatering Settlement Basins. The tallest building on the RWI&PS site would be the Microfiltration Buildings which would be 10.9m above finished ground level. Additionally, there would be a telemetry mast, the top of which would be 14m above finished ground level. • Power for the RWI&PS would be supplied via an underground connection to the existing Birdhill 38 kV electricity substation. • A new permanent access road from the R494 would be constructed to access the proposed RWI&PS site. This access road would be 5m in width and 670m in length. • The RWI&PS site boundary would be fenced with a stock proof fence and a 2.4m high paladin security fence 5m inside the boundary. The site would be landscaped in line with the surrounding environment to reduce its visual impact.
Raw Water Rising Mains (RWRMs) (Pipeline) County Tipperary	• The RWRMs would consist of two 1,500mm underground pipelines made from steel that would carry the raw water approximately 2km from the RWI&PS to the Water Treatment Plant (WTP) at Incha Beg, County Tipperary. The water would be pumped from the pumping station at the RWI&PS to the WTP. • Twin RWRMs have been proposed so that one RWRM can be taken out of service for cleaning and maintenance while still providing an uninterrupted flow of raw water through the other RWRM. • The RWRMs would include Line Valves, a Lay-By, Air Valves and Cathodic Protection. • A 20m wide Permanent Wayleave would provide Uisce Éireann with operational access to the RWRMs.

¹ <https://www.cbd.int/convention/articles/?a=cbd-02>

Proposed Project Infrastructure	Outline Description of Proposed Project Infrastructure*
Water Treatment Plant (WTP) (Infrastructure Site) County Tipperary	- The WTP would be located on a permanent site of approximately 31ha at Incha Beg, County Tipperary, 2.6km north-east of the village of Birdhill, and 2km east of the proposed RWI&PS. In addition, approximately 2.5ha of land would be required on a temporary basis during construction. - The WTP would treat the raw water received from the RWI&PS via the RWRMs. Once treated, the High Lift Pumping Station (HLPS) would deliver the treated water onwards from the WTP to the Break Pressure Tank (BPT) at Knockanacree, County Tipperary, via the Treated Water Pipeline. - The WTP would comprise of a series of tanks and buildings including the Raw Water Balancing Tanks, Water Treatment Module Buildings, Sludge Dewatering Buildings, Sludge Storage Buildings, Clear Water Storage Tanks and HLPS, an Electricity Substation and Power Distribution Building, and the Control Building. The tallest building on the WTP site would be the Water Treatment Module Buildings which would be up to 15.6m above finished ground level. Additionally, there would be a telemetry mast, the top of which would be 14m above finished ground level. - There would also be a potential future water supply connection point at the junction between the permanent access road and the R445. - Power for the WTP would be supplied via an underground connection to the existing Birdhill 38 kV electricity substation. Solar panels would be placed on the roofs of the Chemical Dosing Manifold Building, the Water Treatment Module Buildings, Clear Water Storage Tanks and Sludge Storage Buildings, and at a number of locations on the ground to supplement the mains power supply. - A new permanent access road from the R445 would be constructed and would be 6m in width and 640m in length. - The WTP site boundary would be fenced with a stock proof fence and a 2.4m high palisade security fence 5m inside the boundary. The site would be landscaped in line with the surrounding environment to reduce its visual impact.
Treated Water Pipeline from the WTP to the BPT (Pipeline) County Tipperary	- The Treated Water Pipeline from the WTP to the BPT would consist of a single 1,600mm underground steel pipeline which would be approximately 37km long. The water would be pumped through this section of the Treated Water Pipeline by the HLPS. - The Treated Water Pipeline would include Line Valves, Washout Valves, Air Valves, Manways, Cathodic Protection and Lay-Bys. - A 20m wide Permanent Wayleave would provide Uisce Éireann with operational access to the pipeline (this Wayleave has been extended to approximately 30m at some Line Valves to provide access between the Lay-Bys and Line Valves). There would be an additional 10m wide Permanent Wayleave at certain locations for operational access to smaller pipes connecting Washout Valves with permanent discharge locations.
Break Pressure Tank (BPT) (Infrastructure Site) County Tipperary	- The BPT would be located on a permanent site of approximately 7ha in the townland of Knockanacree, County Tipperary. In addition, approximately 0.8ha of land would be required on a temporary basis during construction. - The BPT would be located at the highest point of the pipeline. It marks the end of the Treated Water Pipeline from the WTP to the BPT and the start of the Treated Water Pipeline from the BPT to the Termination Point Reservoir (TPR) in the townland of Loughtown Upper, at Peamount, County Dublin. It would act as a balancing tank and would be required to manage the water pressures in the entire Treated Water Pipeline during flow changes, particularly during start-up and shut-down. - The BPT site would include the BPT and a Control Building. The BPT would be a concrete tank divided into three cells covered with an earth embankment. The BPT tanks would be 5m in height and partially buried below finished ground levels. The Control Building would be 7.5m over finished ground level. Additionally, there would be a telemetry mast, the top of which would be 14m above finished ground level. - Access to the BPT site would be via a new permanent access road from the L1064 which would be 5m wide and 794m in length. - Power for the BPT would be supplied via an underground connection from the existing overhead power line. Solar panels would be placed on the south facing side of the control building roof, on the BPT and at ground level to the south of the site to supplement the mains power supply. - The BPT site boundary would be bounded by the existing hedgerow / tree line with a 2.4m high palisade security fence around the permanent infrastructure. The site would be landscaped in line with the surrounding environment to reduce its visual impact.

Proposed Project Infrastructure	Outline Description of Proposed Project Infrastructure*
Treated Water Pipeline from the BPT to the TPR (Pipeline) Counties Tipperary, Offaly, Kildare and Dublin (within the administrative area of South Dublin County Council)	• The Treated Water Pipeline from the BPT to the TPR would consist of a single 1,600mm underground steel pipeline, approximately 133km long. • The water would normally travel through the Treated Water Pipeline by gravity; however, flows greater than approximately 165Mld would require additional pumping from the Booster Pumping Station (BPS) in the townland of Coagh Upper, County Offaly. • The Treated Water Pipeline would include Line Valves, Washout Valves, Air Valves, Manways, Cathodic Protection, Lay-Bys and potential future connection points. • A 20m wide Permanent Wayleave would provide Uisce Éireann with operational access to the pipeline (this Wayleave has been extended to approximately 30m at some Line Valves to provide access between the Lay-Bys and Line Valves). There would be an additional 10m wide Permanent Wayleave at certain locations for operational access to smaller pipes connecting Washout Valves with permanent discharge locations.
Booster Pumping Station (BPS) (Infrastructure Site) County Offaly	• The BPS would be located on a permanent site of approximately 2.6ha in the townland of Coagh Upper, County Offaly. It would be located approximately 30km downstream from the BPT. In addition, approximately 3ha of land would be required on a temporary basis during construction. • The BPS would be required when the demand for water causes the flow through the pipeline to exceed approximately 165Mld. • The BPS site would consist of a single-storey Control Building with a basement below. It would have a finished height of 7.6m above finished ground level. There would also be a separate Electricity Substation and Power Distribution Building. Additionally, there would be a telemetry mast, the top of which would be 14m above finished ground level. • Power to the BPS would be supplied from an existing 38 kV electricity substation at Birr, through cable ducting laid within the public road network. There would be ground mounted solar panels on the southern side of the BPS site to supplement the mains power supply. • The site would be accessed directly from the L3003. • The BPS site boundary would be fenced with a stock proof fence and a 2.4m high palisade security fence between 5m -12m inside the boundary. The site itself would be landscaped in line with the surrounding environment to reduce its visual impact.
Flow Control Valve (FCV) (Infrastructure Site) County Kildare	• The FCV controls the flows in the Treated Water Pipeline from the BPT to the TPR. It would be a small permanent site of approximately 0.5ha in the townland of Commons Upper in County Kildare. In addition, approximately 0.6ha of land would be required on a temporary basis during construction. • It would consist of three 700mm diameter FCVs and three flow meters installed in parallel with the Line Valve and housed within an underground chamber. • Access to the FCV site would be directly off the L1016 Commons Road Upper. • Power supply to the FCV site would be provided from the existing low voltage network via a combination of overhead lines and buried cables. There would be ground mounted solar panels on the north-eastern side of the site to supplement the mains power supply. • Kiosks at the FCV site would house the Programmable Logic Controller, telemetry and power supply for the Line Valve. There would also be a telemetry mast, the top of which would be 14m above finished ground level. • The site boundary would be fenced with a stock proof fence and a 2.4m high palisade security fence 5m inside the boundary.

Proposed Project Infrastructure	Outline Description of Proposed Project Infrastructure*
Termination Point Reservoir (TPR) (Infrastructure Site) County Dublin (within the administrative area of South Dublin County Council)	- The TPR would be located on a permanent site of approximately 8.3ha adjacent to an existing treated water reservoir in the townland of Loughtown Upper, at Peamount, County Dublin (within the administrative area of South Dublin County Council) and would have capacity for 75Ml of treated water supply. In addition, approximately 1.1ha of land would be required on a temporary basis during construction. - It would be located at the downstream end of the Treated Water Pipeline from the BPT to the TPR and would be the termination point for the Proposed Project. It would be at this location that the Proposed Project would connect to the existing water supply network of the Greater Dublin Area Water Resource Zone (GDA WRZ). - The TPR would consist of an above-ground storage structure, associated underground Scour Water and Overflow Water tanks and a Chlorine Dosing Control Building. The TPR would be a concrete tank divided into three cells and covered with an earth embankment. The top of the TPR would be 11.2m above finished ground level. The Chlorine Dosing Control Building would be 8.4m over finished ground level. Additionally, there would be a telemetry mast, the top of which would be 14m above finished ground level. - Power for the TPR would be supplied via an underground connection to the existing electricity substation at Peamount Reservoir. There would be solar panels on top of a portion of the northern cell of the TPR to supplement the mains power supply. - A new permanent access road from the R120 would be constructed and would be 5m wide and 342m in length. - The TPR site would be bounded by the existing hedgerow to the west and existing fence to the east with a 2.4m high palisade security fence around the permanent infrastructure. The site itself would be landscaped in line with the surrounding environment to reduce its visual impact.
Proposed 38 kV Uprate Works – Power Supply to RWI&PS and WTP	
Proposed 38 kV Uprate Works Ardnacrusha – Birdhill (Power Supply) Counties Clare, Limerick and Tipperary	- The proposed 38 kV Uprate Works would be necessary to deliver adequate electrical power to the RWI&PS and WTP. - The proposed works would include the uprating of the existing Ardnacrusha – Birdhill Line and the replacement of polesets/structures with an underground cable along a section of the Ardnacrusha – Birdhill – Nenagh Line. - There would also be works at the existing Birdhill 38 kV electricity substation including the provision of a new 38 kV modular Gas Insulated Switchgear Modular Building, new electrical equipment and lighting, together with new fencing and associated works.
Temporary Infrastructure – Required for Construction Phase Only	
Construction Working Width Counties Tipperary, Offaly, Kildare and Dublin (within the administrative area of South Dublin County Council)	- A Construction Working Width would be temporarily required for the construction of the RWRMs and the Treated Water Pipeline, and the subsequent reinstatement of the land. - The Construction Working Width would generally be 50m in width but would be locally wider near features such as crossings, access and egress points from the public road network, Construction Compounds and Pipe Storage Depots.
Construction Compounds Counties Tipperary, Offaly, Kildare and Dublin (within the administrative area of South Dublin County Council)	- Eight Construction Compounds would be temporarily required to facilitate the works to construct the Proposed Project. Five Construction Compounds would be located along the route of the Treated Water Pipeline at the following Infrastructure Sites: RWI&PS, WTP, BPT, BPS and TPR, with an additional three Construction Compounds located at Lisgarraff (County Tipperary), Killananny (County Offaly) and Drummond (County Kildare). Construction Compounds would act as a hub for managing the works including plant/material/worker movement, general storage, administration and logistical support. - The Principal Construction Compound at the WTP would require 30ha of land during construction. - The other three Principal Construction Compounds would require land temporarily during construction ranging between approximately 12ha and 16ha. - The four Satellite Construction Compounds at the other permanent Infrastructure Sites (excluding the FCV) would require land during construction ranging between approximately 3ha and 12ha.
Pipe Storage Depots Counties Tipperary, Offaly and Kildare	- Nine Pipe Storage Depots would be temporarily required to supplement the Construction Compounds and would serve the installation of pipe between the WTP and the TPR. - Pipe Storage Depots would take direct delivery of the pipe for storage before onward journey to the required location along the Construction Working Width. - The Pipe Storage Depots would vary in size and require land temporarily during construction generally ranging between approximately 2ha and 7ha but with one site being larger at 11ha.

* Note all land take numbers in this table are affected by rounding to one decimal place.

4. The assessment reported in this chapter has considered the mitigation that has been embedded into the design to avoid or reduce environmental effects. Embedded mitigation is an intrinsic part of the Proposed Project design and therefore the assessment of effects assumes all embedded design measures are in place. Embedded mitigation relevant to this topic is included in Section 8.8 to 8.10.
5. The construction of the Proposed Project is anticipated to run from 2028 through 2032, with the first operational year anticipated to be 2033.
6. This chapter should be read in conjunction with the following chapters, and their appendices, which expand upon environmental aspects of the Proposed Project:
 - Chapter 6 (Noise & Vibration)
 - Chapter 9 (Water)
 - Chapter 10 (Soils, Geology and Hydrogeology)
 - Chapter 12 (Air Quality)
 - Chapter 16 (Landscape & Visual).
7. This chapter is also supported by the following documents, which present the results of surveys undertaken between 2016 and 2025 and licence applications:
 - Appendix A8.1 (Parteen Basin Habitat Assessment)
 - Appendix A8.2 (Assessment of the Woodland Near Parteen Weir)
 - Appendix A8.3 (Site Description of Coagh Upper Fen, County Offaly)
 - Appendix A8.4 (Target Habitat Surveys Report)
 - Appendix A8.5 (Rare Plant Surveys Report)
 - Appendix A8.6 (Fungi Survey Report)
 - Appendix A8.7 (Lichen Survey Report)
 - Appendix A8.8 (Bryophyte Survey Report)
 - Appendix A8.9 (Bat Surveys Report)
 - Appendix A8.10 (Lepidoptera Survey Report)
 - Appendix A8.11 (Vertigo Survey Report)
 - Appendix A8.12 (Parteen Basin Mollusc Survey Report)
 - Appendix A8.13 (Water Treatment Plant Mollusc Survey Report)
 - Appendix A8.14 (Watercourse Crossing Data)
 - Appendix A8.15 (National Research Programme Lakes 2016: Parteen Basin (Lower Lough Derg), Inland Fisheries Ireland Report)
 - Appendix A8.16 (National Research Programme Lakes 2016: Lough Derg, Inland Fisheries Ireland Report)
 - Appendix A8.17 (Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2017))
 - Appendix A8.18 (Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2019))
 - Appendix A8.19 (Aquatic Invasive Species Survey Report)
 - Appendix A8.20 (Underwater Noise Modelling Report)
 - Appendix A8.21 (Breeding Bird Surveys Summary Report)

- Appendix A8.22 (Winter Bird Surveys Summary Report)
 - Appendix A8.23 (Aquatic Invasive Species and Macrophyte Survey at Lough Derg and Parteen Basin)
 - Appendix A8.24 (Bat Derogation Licence Application)
 - Appendix A8.25 (Otter Derogation Licence Application).
8. 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. Further details regarding the surveys undertaken are outlined in Section 8.2 and Section 8.3.
 9. To aid the reader throughout this EIAR, unique identification labels have been assigned to crossings (water, road, rail, and power), valves, compounds and depots, and access and egress points. Identification labels are provided in Chapter 4 (Proposed Project Description).
 10. Figures which are referenced in the text are provided in Volume 5 of this EIAR.
 11. Table 8.2 outlines the various ecological receptors considered as part of this assessment and outlines where in the document the reader can find information on the baseline environment, Construction Phase impacts, Operational Phase impacts, proposed mitigation and monitoring measures and any residual effects as they relate to that ecological receptor.
 12. This assessment has been undertaken and reported by a team of competent experts. Refer to Chapter 2 (The Environmental Impact Assessment Process) for a description of the qualifications and expertise of the specialists that have inputted to this chapter.

Table 8.2: Structure of this Chapter by Ecological Receptor

Ecological Receptor		Baseline Environment	Construction and Commissioning Phase Impacts	Operational Phase Impacts	Mitigation and Monitoring Measures – Construction and Commissioning Phase	Mitigation and Monitoring Measure – Operational Phase	Residual Effects
		Section 8.3	Section 507 and Section 8.6	Section 8.7	Section 8.8 and Section 8.9	Section 8.10	Section 8.11
Designated Areas of Nature Conservation							
Designated Areas of Nature Conservation		Section 8.3.1	Section 8.5.1	Section 8.7.1	Section 8.8.1	Section 1083	Section 8.11.1
Terrestrial Ecology							
Terrestrial Habitats	Habitats and Flora	Section 8.3.2.1	Section 8.5.2.1	Section 8.7.2.1	Section 8.8.2.1	Section 8.10.2.1	Section 8.11.2.1
	Bord Na Móna Lands	Section 8.3.2.1					
	Rare and/or Protected Habitats	Section 8.3.2.1					
	Rare and/or Protected Flora	Section 8.3.2.1					
	Terrestrial Invasive Non-Native Species (INNS)	Section 8.3.2.1					
Mammals	Bats	Section 8.3.2.2	Section 8.5.2.2	Section 8.7.2.2	Section 8.8.2.2	Section 8.10.2.2	Section 8.11.2.2
	Eurasian Badger (<i>Meles meles</i>)	Section 8.3.2.3	Section 8.5.2.3	Section 8.7.2.3	Section 8.8.2.3	Section 8.10.2.3	Section 8.11.2.3
	Otter (<i>Lutra lutra</i>)	Section 8.3.2.4	Section 8.5.2.4	Section 8.7.2.4	Section 8.8.2.4	Section 8.10.2.4	Section 8.11.2.4
	Other Mammal Species	Section 8.3.2.5	Section 8.5.2.5	Section 8.7.2.5	Section 8.8.2.5	Section 8.10.2.5	Section 8.11.2.5
Invertebrates	Lepidoptera	Section 8.3.2.6	Section 8.5.2.6.1	Section 8.7.2.7.1	Section 8.8.2.6	Section 8.10.2.6	Section 8.11.2.6
	Molluscs	Section 8.3.2.7	Section 8.5.2.6.2	Section 8.7.2.7.2	Section 8.8.2.6	Section 8.10.2.6	Section 8.11.2.6
Other Species Groups	Reptiles and Amphibians	Section 8.3.2.8	Section 8.5.2.7	Section 8.7.2.8	Section 8.8.2.7	Section 8.10.2.7	Section 8.11.2.7

Ecological Receptor		Baseline Environment	Construction and Commissioning Phase Impacts	Operational Phase Impacts	Mitigation and Monitoring Measures – Construction and Commissioning Phase	Mitigation and Monitoring Measure – Operational Phase	Residual Effects
		Section 8.3	Section 507 and Section 8.6	Section 8.7	Section 8.8 and Section 8.9	Section 8.10	Section 8.11
Aquatic Ecology							
Aquatic Habitats and Plant Communities		Section 8.3.3.1	Section 8.5.3	Section 8.7.3	Section 8.8.3	Section 8.10.3	Section 8.11.3
Protected Aquatic Species	Atlantic Salmon (<i>Salmo salar</i>)	Section 8.3.3.3					
	Freshwater Pearl Mussel (<i>Margaritifera margaritifera</i>)	Section 8.3.3.4					
	White-clawed Crayfish (<i>Austropotamobius pallipes</i>)	Section 8.3.3.5					
	Lamprey Species	Section 8.3.3.6					
	European eel (<i>Anguilla Anguilla</i>)	Section 8.3.3.8					
Aquatic Macroinvertebrates		Section 8.3.3.2					
Fishery Value		Section 8.3.3.8					
Aquatic INNS		Section 8.3.3.9					
Ornithology – Breeding and Wintering Birds							
Birds	Breeding Birds	Section 8.3.4	Section 8.5.4	Section 8.7.4	Section 8.8.4	Section 8.10.4	Section 8.11.4
	Wintering Birds	Section 8.3.5	Section 8.5.5	Section 8.7.5	Section 8.8.4	Section 8.10.5	Section 8.11.5

8.1.1 Project History

13. A history of the Proposed Project is provided in Chapter 3 (Consideration of Reasonable Alternatives). Following various non-statutory public consultations and 'on-the-ground' investigations, the final route, referred to herein as the Proposed Project, was selected.
14. The Proposed Project took into consideration the avoidance of potential impacts on ecological receptors and/or protected species. The approach taken throughout the process of identifying the Proposed Project included avoiding, where feasible, Special Areas of Conservation (SACs), Special Protected Areas (SPAs), Ramsar sites, Natural Heritage Areas (NHAs), proposed Natural Heritage Areas (pNHAs), and known records of protected species (such as badger, otter and bat). The route selection process is further detailed in Chapter 3 (Consideration of Reasonable Alternatives).
15. Some baseline data collected during the process of identifying the Proposed Project and its route/location, covering different geographic locations along the route of the Proposed Project, have been included to demonstrate where sensitive areas were avoided and explain additional survey efforts over the years.

8.2 Methodology

8.2.1 Scope of Assessment

16. This chapter assesses the effects of the Proposed Project on biodiversity. The assessment covers the Construction Phase (including pre-construction and the Testing and Commissioning Phase) and Operational Phase. The scope of the assessment was determined through a review of relevant published and unpublished sources of data, collation of existing information on the ecological environment, and consultation with relevant statutory bodies to identify relevant issues (e.g. National Parks and Wildlife Service (NPWS) and Inland Fisheries Ireland (IFI), as well as non-statutory bodies). No potential impacts were scoped out of the EIAR.
17. The scope of this biodiversity assessment includes the following:
 - Habitat loss and fragmentation
 - Habitat degradation and physical disturbance
 - Noise and vibration disturbance of protected fauna
 - Pollution risks to surface water quality and associated biodiversity
 - Pollution risks to groundwater quality and associated groundwater dependent terrestrial ecosystems (GWDTEs) and species
 - Risk of introduction/spread of invasive and non-native species (INNS) or pathogens
 - Mortality of aquatic and terrestrial fauna
 - Abstraction of water.
18. The key steps of the biodiversity assessment included:
 - A desktop study to determine previously recorded biodiversity within the study area
 - Baseline flora and fauna surveys of areas that could be impacted by the Proposed Project (study area)
 - Evaluation of the biodiversity of the study area based on the results of desk and field studies and identification key ecological receptors (KERs)
 - Prediction of the potential direct, indirect and cumulative effects of the Proposed Project on the biodiversity of the area

- Identification of appropriate mitigation, compensation and monitoring measures in the design, construction, and operation of the Proposed Project to reduce likely significant effects on biodiversity
 - Assessment of residual effects post-mitigation
 - Reporting of the conclusions of this assessment of the EIAR (Biodiversity) in accordance with the requirements of national and international legislation
 - Support the preparation of a Natura Impact Statement (NIS) for the Proposed Project, which was prepared iteratively with this assessment.
19. 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 will be decommissioned and therefore, decommissioning of the Proposed Project has not been considered further in this assessment.

8.2.2 Zone of Influence and Study Area

20. The Zone of Influence (Zol) is the area over which the Proposed Project could have a significant effect (including positive and negative effects) on a given receptor. The Zol over which significant effects may occur differs for different ecological receptors. Significant effects are deemed to be those impacts resulting in a likely change in conservation status or integrity of an ecological receptor (Section 8.2.7.3).
21. The first step in determining the Zol is to analyse the characteristics of the Proposed Project and identify the range of the Zol. As recommended by CIEEM (2018), professionally accredited or published studies have been used to determine the Zol (Table 8.3).
22. Once identified, a receptor-specific Zol was used to inform the study areas (Table 8.4) which were then used to inform the impact assessment. It should be noted, the Zol and study areas for the Construction Phase are considered to be inclusive of the Zol and study areas for the Operational Phase (i.e. the impacts during the Operational Phase would be similar, but to a lesser extent). Thus, Table 8.3 and Table 8.4 focus on the Construction Phase as a worst-case. The exception is the Zol associated with the abstraction during the Operational Phase, which is considered in more detail in Section 8.2.2.1.

Table 8.3: Zone of Influence Informing the Assessment for the Proposed Project

Ecological Feature		Protected and/or Significant Examples	Potential Source(s) of Effect from Proposed Project	Potential Effect Pathways	Zol (Distance from Proposed Project)	Rationale
Designated Areas of Nature Conservation						
Designated Areas of Nature Conservation		SACs, SPAs, pNHAs, NHAs, Ramsar Sites, Nature Reserves, Designated Salmonid Waters	Vegetation clearance, earthworks, piling, in-stream works, abstraction, traffic emissions	Habitat loss, habitat degradation, disturbance, injury/mortality	0m for direct impacts (i.e. habitat loss or injury/mortality within the Proposed Project² only). For indirect impacts associated with the abstraction the Zol extends from Meelick Weir to the confluence of the Shannon (Limerick Dock) and the Ardnacrusha Tailrace (Section 8.2.2.1). For indirect impacts, Zol 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 (<i>Circus cyaneus</i>) is 2km, with a maximum range of 10km (SNH 2016). Hardey <i>et al.</i> (2013) state that the average hunting range for a male hen harrier during breeding season is 7.3km.	Species with an unfavourable conservation status are more sensitive to the effects of certain impacts. Receptors sensitive to the potential impacts associated with the Proposed Project are more likely to be impacted. Species that use habitats found within the Proposed Project are more likely to be encountered. Nearby designated areas of nature conservation that contain mobile protected or qualifying interest (QI) species may find supporting habitat within the Proposed Project.
Terrestrial Ecology						
Habitats and Flora	Terrestrial habitats and flora	Semi-natural grassland, lowland meadows, woodland habitats	Vegetation clearance (RWRMs, Treated Water Pipeline, infrastructure sites, Ancillary Pipe Infrastructure and cabling and installation of interpoles), earthworks	Habitat loss, habitat fragmentation, habitat degradation	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts in relation to dust effects during the Construction Phase, the Zol was limited to sensitive ecological habitats within 50m of the Proposed Project (Institute of Air Quality Management (IAQM) 2024). The Zol 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). 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.	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 significant effects as a result of the Proposed Project.
	Surface water dependent habitats and flora	Riparian habitats, alluvial woodlands, wet grassland	Vegetation clearance, earthworks, piling, in-stream/ riparian zone works, abstraction	Habitat loss, habitat fragmentation, habitat degradation	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts associated with the abstraction the Zol extends from Meelick Weir to the confluence of the Shannon (Limerick Dock) and the Ardnacrusha Tailrace (Section 8.2.2.1). For indirect impacts, the Zol would vary with the type of impact, the topography, and the sensitivity of the habitat or flora. The Zol would be expected to be no more than 200m from where significant source-pathway-receptors occur.	Vegetation clearance and earthworks 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. The potential Zol with respect to indirect habitat degradation via hydrological pathways is defined as any surface water dependent habitats or flora downstream or downgradient of the Proposed Project.
	Groundwater dependent habitats/species	Alluvial woodlands, petrifying springs, peatlands, fens, turloughs	Earthworks and/or piling (RWRMs, Treated Water Pipeline, infrastructure sites, Ancillary Pipe Infrastructure and cabling and installation of interpoles)	Interference with groundwater supply or quality. Note for the 38 kV Uprate Works there would be no interference with groundwater supply or quality	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts, the Zol is considered to be up to 200m from where significant source-pathway-receptors occur. There would be no proposed works within a GWDTE groundwater body (GWB). The 200m Zol reflects the temporary dewatering as outlined in 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.	The potential Zol of the Proposed Project with respect to hydrogeological impact pathways has been defined based upon detailed hydrogeological investigations and advice of the hydrogeologists engaged by Uisce Éireann. The Zol is based on a case-by-case basis for each GWDTE based on the source-pathway-receptor model.

² The footprint of the Proposed Project refers to the Planning Application Boundary.

Ecological Feature		Protected and/or Significant Examples	Potential Source(s) of Effect from Proposed Project	Potential Effect Pathways	ZoI (Distance from Proposed Project)	Rationale
Mammals	Mammal commuting and/or foraging habitats	Bats, otter, badger, hedgehog (<i>Erinaceus europaeus</i>), stoat (<i>Mustela erminea hibernica</i>), pine marten (<i>Martes martes</i>), pygmy shrew (<i>Sorex minutus</i>), red squirrel (<i>Sciurus vulgaris</i>), deer (<i>Cervidae spp.</i>), Irish hare (<i>Lepus timidus</i>)	Vegetation clearance (RWRMs, Treated Water Pipeline, infrastructure sites, Ancillary Pipe Infrastructure and cabling and installation of interpoles), lighting	Direct impacts associated with altered or decreased routes for commuting and/or foraging or indirect disturbance from noise or lighting of commuting and/or foraging corridors	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.	Vegetation clearance would only occur within the footprint of the Proposed Project, therefore only commuting and/or foraging corridors within the Proposed Project are at risk of potential direct loss or alteration. Given the large foraging ranges for some species (for example, Leisler's bats (<i>Nyctalus leisleri</i>) have been recorded foraging up to 13km from maternity roost sites [Department for Environment, Food and Rural Affairs 2001]) 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 5km of important roost sites (e.g. maternity roosts) (Collins 2023). The ZoI for otters, badgers, hedgehogs, stoat and pine marten may extend over greater distances than small mammal species due to their ability to disperse many kilometres from their natal site. The ZoI for small mammal species, such as the pygmy shrew, would be expected to be limited to no more than 100m from the Proposed Project due to their small territory sizes and sedentary lifecycle.
	Mammal breeding or resting sites	Otter holts, badger setts, hedgehog nest, stoat warrens, pine marten and Irish hare dens, red squirrel dreys	Vegetation clearance, earthworks, piling, in-stream/ riparian zone works	Direct loss from damage or destruction of breeding or resting places within the Proposed Project or indirect disturbance from human presence or noise and vibration	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts the ZoI considered to be 50m from the Proposed Project but may extend up to 150m from the Proposed Project in areas where piling is proposed.	Vegetation clearance and earthworks would only occur within the footprint of the Proposed Project, therefore only breeding or resting places within the Proposed Project are at risk of potential direct loss. The ZoI for indirect disturbance from noise and vibration and human presence effects for mammals including otters, badgers, hedgehogs, stoat and pine marten, may extend up to 150m (where piling would be undertaken) from the Proposed Project in accordance with guidance on road construction-related disturbance of underground sites for otter from the National Roads Authority (NRA 2008a).
	Bats (roosting)	All bats are Annex IV European protected species in Ireland (lesser horseshoe is also Annex II)	Vegetation clearance, tree or structure removal, lighting	Direct loss or habitat fragmentation from damage or destruction of roosting features in trees or structures within the Proposed Project or indirect disturbance from noise and/or lighting of roosts	0m for direct impacts (i.e. within Proposed Project only). For indirect impacts the ZoI varies with factors such as species, roost type and core sustenance zone (CSZ) and is considered to be up to 5km from the Proposed Project.	Vegetation clearance or structure removal would only occur within the footprint of the Proposed Project, therefore only roosting features within the Proposed Project are at risk of potential direct loss. However, for indirect impacts, consideration was also given to the CSZ, as defined in the Bat Conservation Trust (BCT) guidance (Collins 2023) as <i>'the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost'</i> . Considering the CSZ radius of the different bat species recorded during the surveys, the ZoI was determined to be up to 5km from important roost sites.
Invertebrates	Butterflies, dragonflies, damselflies, beetles, bees, etc.	Marsh fritillary (<i>Euphydryas aurinia</i> ; Ireland's only European protected butterfly), nationally protected butterflies and Red Listed* bees and Odonata (dragonflies, damselflies)	Vegetation clearance (RWRMs, Treated Water Pipeline, infrastructure sites, Ancillary Pipe Infrastructure and cabling and installation of interpoles), earthworks, piling	Habitat loss, habitat degradation, disturbance, injury/mortality	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts, the ZoI would vary with the type of impact, the topography, and the sensitivity of the habitat or species. The ZoI would be expected to be no more than 200m from where significant source-pathway-receptors occur. There would be no proposed works within a GWDTE GWB. The 200m ZoI reflects the temporary dewatering as outlined in Chapter 10 (Soils, Geology and Hydrogeology).	Vegetation clearance would only occur within the footprint of the Proposed Project, therefore invertebrates in habitats within the footprint are the only invertebrates potentially at risk of direct habitat loss, disturbance, or injury/mortality. The potential ZoI with respect to indirect hydrological impacts, resulting in potential habitat degradation of suitable wetland habitats for invertebrate species, is defined as any surface water dependent habitats downstream or downgradient of the Proposed Project. The ZoI was refined based upon detailed hydrogeological investigations and advice of the design team's hydrogeologists. The ZoI is based on a case-by-case basis for each GWDTE based on the source-pathway-receptor model.
	Molluscs	Annex II-listed whorl snail (<i>Vertigo</i> spp.), Red Listed rare species				
Other Species Groups	Reptiles and amphibians	Common lizard (<i>Zootoca vivipara</i>), common frog (<i>Rana temporaria</i>), smooth newt (<i>Lissotriton vulgaris</i>) (note: natterjack toad (<i>Epidalea calamita</i>) is only known to occur in County Kerry and County Wexford (translocated population) which are beyond the ZoI of the Proposed Project)	Vegetation clearance, earthworks, piling, in-stream/ riparian zone works	Habitat loss, habitat degradation, disturbance, injury/mortality	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts, the ZoI would vary with the type of impact, the topography, and the sensitivity of the habitat or species. The ZoI would be expected to be no more than 200m from where significant source-pathway-receptors occur.	Vegetation clearance and earthworks would only occur within the footprint of the Proposed Project, therefore reptiles and amphibians in habitats within the footprint are the only species potentially at risk of direct habitat loss, disturbance, or injury/mortality. The potential ZoI with respect to indirect hydrological impacts on suitable wetland habitats for amphibian species is defined as any surface water dependent habitats downstream or downgradient of the Proposed Project.
Aquatic Ecology						
Habitats and Flora	Aquatic habitats and flora	Rivers, streams, drainage ditches, aquatic plant communities, floating river vegetation	In-stream/riparian zone works, piling, abstraction	Habitat loss, habitat fragmentation, habitat degradation	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 8.2.2.1). 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 loss. 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.

Ecological Feature		Protected and/or Significant Examples	Potential Source(s) of Effect from Proposed Project	Potential Effect Pathways	ZoI (Distance from Proposed Project)	Rationale
Aquatic Fauna	Aquatic fauna in freshwater habitats	Annex II and V European protected species in Ireland: sea, brook and river lamprey, Atlantic salmon, white-clawed crayfish	In-stream/riparian zone works, piling, abstraction	Habitat loss, habitat fragmentation, habitat degradation, disturbance, injury/mortality	0m for direct impacts (i.e. within 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 8.2.2.1). For indirect impacts associated with the pipeline, the ZoI is limited to protected aquatic fauna in water bodies to which runoff from the Proposed Project could drain to during construction. 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 fauna within the Proposed Project are the only species potentially at risk of direct habitat loss, disturbance or injury/mortality. 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.
	Aquatic fauna sensitive to underwater noise and vibration disturbance in freshwater habitats	Annex II and V European protected species in Ireland: salmonids and lamprey species	In-stream works, piling and pipe jacking	Disturbance, injury/mortality	To determine the ZoI, modelled noise levels were interpreted in accordance with the guidelines outlined in Popper <i>et al.</i> (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. 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 (Appendix A8.20: Underwater Noise Modelling Report).
Ornithology – Breeding and Wintering Birds						
Birds	Breeding birds (Key Species of Conservation Concern)	Birds listed on Annex I of the Birds Directive, birds listed as being of high (Red Listed) or medium (Amber Listed) conservation concern as identified by Gilbert <i>et al.</i> (2021), or in the case of the 38 kV Uprate Works, birds identified as being at high risk from collisions with overhead powerlines as identified by EirGrid (2020).	Vegetation clearance, earthworks, piling, in-stream/riparian zone works, abstraction	Habitat loss, habitat fragmentation, habitat degradation, disturbance, injury/mortality	0m for direct impacts (i.e. habitat loss within the Proposed Project only)	Vegetation clearance and earthworks would only occur within the footprint of the Proposed Project, therefore breeding and wintering birds within the footprint are the only species potentially at risk of direct habitat loss, habitat fragmentation, habitat degradation, disturbance, or injury/mortality. For indirect impacts, the ZoI varies with species, type of impact, and pathway. A 300m buffer distance is commonly applied in practice as a conservative buffer to minimise disturbance to breeding and wintering birds. This approach is supported by multiple studies and guidance including, Ruddock & Whitfield (2007), Cutts <i>et al.</i> (2013), SNH (2017) and Goodship and Furness (2022), which highlight variability among species but acknowledge that 300m broadly covers typical disturbance distances for many sensitive bird species. Species-specific considerations are applied, where relevant. Species with an unfavourable conservation status are more sensitive to the effects of certain impacts. Receptors sensitive to the potential impacts associated with the Proposed Project are more likely to be impacted. Species that use habitats found within the Proposed Project are more likely to be encountered. Nearby Special Protection Areas (SPAs) that contain mobile qualifying interest (QI) species may find supporting habitat within the Proposed Project.
	Breeding birds (Other Species of Low Conservation Concern/ Green Listed)	Birds listed as being of Low (Green Listed) conservation concern as identified by Gilbert <i>et al.</i> (2021), and/or lower risk of collision with overhead powerlines as identified by EirGrid (2020).			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 8.2.2.1).	
	Wintering birds (Key Species of Conservation Concern)	Wading birds, gulls, duck, geese, and swans that are protected under Annex I of the Birds Directive, birds listed as being of high (Red Listed) and medium (Amber Listed) conservation concern as identified by Gilbert <i>et al.</i> (2021), or in the case of the 38 kV Uprate Works, birds identified as being at high risk from collisions with overhead powerlines as identified by EirGrid (2020).	Vegetation clearance, earthworks, piling, in-stream/riparian zone works, abstraction	Habitat loss, habitat fragmentation, habitat degradation, disturbance, injury/mortality	0m for direct impacts (i.e. habitat loss within the Proposed Project only)	
	Wintering birds (Other Species of Low Conservation Concern/Green Listed)	Birds listed as being of Low (Green Listed) conservation concern as identified by Gilbert <i>et al.</i> (2021), and/or lower risk of collision with overhead powerlines as identified by EirGrid (2020).			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 8.2.2.1).	

Note: * Various Red Lists are available at: <https://www.npws.ie/publications/red-lists>

8.2.2.1 Abstraction Zone of Influence

23. For the proposed abstraction at the RWI&PS site, the Zol was defined in part by the extent of the water body with respect to the nearest points of effective hydraulic control. Electricity Supply Board (ESB) controls water levels on Lough Derg and the movement of water at, and through, Parteen Basin 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.
24. To determine the upstream Zol 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. As discussed in Chapter 9 (Water), the 'upstream limit' of the abstraction Zol 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.
25. The 'downstream limit' of the abstraction Zol 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.
26. Between the upstream and downstream limits, the Zol also considered a number of water bodies which are hydrologically connected to Lough Derg (see Chapter 9 Water).
27. 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 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.
28. 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 10m³/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.

Table 8.4: Study Areas Informing the Assessment for the Proposed Project

Ecological Receptor		Zone of Influence	Study Area
Designated Areas of Nature Conservation			
Designated Areas of Nature Conservation		0m for direct impacts (i.e. habitat loss or injury/mortality within the Proposed Project only). For indirect impacts associated with the abstraction the Zol extends from Meelick Weir to the confluence of the Shannon (Limerick Dock) and the Ardnacrusha Tailrace (Section 8.2.2.1). For indirect impacts, Zol 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 <i>et al.</i> (2013) state that the average hunting range for a male hen harrier during breeding season is 7.3km.	The desktop review study area considered a 15km buffer around the Proposed Project (as an initial screening only) and was subsequently refined to include any other Designated Areas of Nature Conservation with a source-pathway-receptor with the Proposed Project, regardless of distance from the Proposed Project. The field surveys study area included 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. The field survey study area also included the footprint of the 38 kV Uprate Works, and a minimum 30m-wide buffer along the length of the existing 38 kV overhead lines (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. The study area for the access tracks was reduced to 15m as there is no proposed works in these areas (i.e. access will be gained by traversing along existing farm entrances and tracks and/or tracking across farmland). The results of the water quality and hydrological modelling indicate water abstraction from Parteen Basin would not significantly change the current hydrology, water quality and geomorphology of Lough Derg and Parteen Basin. Thus, the study area in relation to potential impacts associated with the abstraction was contained to the footprint of the RWI&PS.
Terrestrial Ecology			
Terrestrial Habitats	Terrestrial habitats or flora	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts in relation to dust effects during the Construction Phase, the Zol was limited to sensitive ecological habitats within 50m of the Proposed Project (IAQM 2024). The Zol 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). 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.	The field surveys study area included 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. It also included 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. With respect to impacts from air quality emissions from vehicle and heavy-duty vehicles, the study area also included sensitive receptors and relevant sensitive ecological habitats within 200m from road links, which would be affected by significant changes in traffic flows (as per Chapter 12: Air Quality).

Ecological Receptor		Zone of Influence	Study Area
Terrestrial Habitats	Surface water dependent habitats or flora	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts associated with the abstraction the Zol extends from Meelick Weir to the confluence of the Shannon (Limerick Dock) and the Ardnacrusha Tailrace (Section 8.2.2.1). For indirect impacts, the Zol would vary with the type of impact, the topography, and the sensitivity of the habitat or flora. The Zol would be expected to be no more than 200m from where significant source-pathway-receptors occur.	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 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. The study area for the access tracks was reduced to 15m as there is no proposed works in these areas (i.e. access will be gained by traversing along existing farm entrances and tracks and/or tracking across farmland). The study area was extended beyond the 75m and 30m-wide buffers where sensitive surface water and groundwater dependent habitats were identified through the desktop review and field studies. The study areas are shown in the habitat assessment reports from surveys undertaken between 2016 and 2024 (see Appendix A8.4: Target Habitat Surveys Report and Appendix A8.5: Rare Plants Survey Report).
	Groundwater dependent habitats/species	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts, the Zol is considered to be up to 200m from where significant source-pathway-receptors occur. The Zol would vary with the type of GWDTE and type of impact; relevant factors include sensitivity to disturbance and species core foraging distance.	
Mammals	Bats	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts, the Zol is considered to be up to 5km from the Proposed Project for commuting and/or foraging habitats. For roosts, the Zol varies with factors such as species, roost type, surrounding habitat, and commuting routes.	The desktop review study area was originally set at 5km but extended to 10km around the Proposed Project for bats, exceeding 'Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes' (NRA 2006) which recommend a 3km buffer zone. Collins (2023) recommends a minimum of 2km buffer zone but this can be extended to 10km for larger projects. Therefore, the desktop study reports at 2km, 5km and 10km level to account for the different recommendation levels. Core Sustainance Zones, as reported by Collins (2023) for each bat species, refers to the area surrounding a bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the bat roost. The upper CSZ value is for Natterer's bats (<i>Myotis nattereri</i>) at 4km. The field surveys study area included 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. This 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. It also included 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. The study area for the access tracks was reduced to 15m as there is no proposed works in these areas (i.e. access will be gained by traversing along existing farm entrances and tracks and/or tracking across farmland). It should be noted, walked transects often extended wider than the 75m and 30m buffers as they followed a continual access route through suitable habitats for bats that traversed the Proposed Project. The study area also included the local road network along the Proposed Project for driven bat transects.

Ecological Receptor		Zone of Influence	Study Area
Mammals	Eurasian badger	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts the Zol may extend up to 150m from the Proposed Project.	The desktop review study area extended to the 10km grid squares surrounding the Proposed Project (i.e. species distribution data recorded within 10km square grid references on a map). The field surveys study area included 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. It also included 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, as well as a 15m-wide corridor along the proposed access tracks. The study area for the access tracks was reduced to 15m as there is no proposed works in these areas (i.e. access will be gained by traversing along existing farm entrances and tracks and/or tracking across farmland). In accordance with NRA guidelines (2006d; 2008a), mammal surveys were extended up to a 150m buffer to follow areas where suitable habitat existed, depending on land access permission, in particular at the RWI&PS and in peat areas where piling works are proposed, as well as at watercourse crossings.
	Otter		
	Other mammal species		
Invertebrates	Lepidoptera	0m for direct impacts (i.e. within the Proposed Project only).	The footprint of the RWI&PS and WTP sites (in response to a consultation recommendation from NPWS) as well as areas within the Proposed Project where potentially suitable habitat exists or within 200m of the Proposed Project. The study areas are shown in the baseline reports from surveys undertaken in 2020 and 2021 (see Appendix A8.11: Vertigo Survey Report, Appendix A8.10: Lepidoptera Survey Report, and Appendix A8.12: Parteen Basin Mollusc Survey Report, as well as Figures 8.109 to Figure 8.212).
	Molluscs		
Other Species Groups	Reptiles and amphibians	For indirect impacts, the Zol would vary with the type of impact, the topography, and the sensitivity of the habitat or species. The Zol would be expected to be no more than 200m from where significant source-pathway-receptors occur.	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 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, as well as a 15m-wide corridor along the proposed access tracks. The study area for the access tracks was reduced to 15m as there is no proposed works in these areas (i.e. access will be gained by traversing along existing farm entrances and tracks and/or tracking across farmland).
Aquatic Ecology			
Habitats and Flora	Rivers, streams, drainage ditches, aquatic plant communities, floating river vegetation	0m for direct impacts (i.e. within the Proposed Project only). For indirect impacts associated with the abstraction the Zol extends from Meelick Weir to the confluence of the Shannon (Limerick Dock) and the Ardnacrusha Tailrace (Section 8.2.2.1). For indirect impacts associated with the pipeline, the Zol is limited to water bodies to which runoff from the Proposed Project could drain during construction. Impacts could occur at significant distances downstream depending on the magnitude and duration of any pollution event.	The footprint of the RWI&PS site and any watercourse crossed by the Proposed Project, including 150m upstream and downstream of the Proposed Project where suitable habitat existed for protected aquatic fauna.
Aquatic Fauna	Annex II and V European protected species in Ireland: sea, brook and river lamprey, Atlantic salmon, white-clawed crayfish		

Ecological Receptor		Zone of Influence	Study Area
Ornithology			
Birds	Breeding birds (Key Species of Conservation Concern)	0m for direct impacts (i.e. within the Proposed Project only) For indirect impacts, the Zol in relation to disturbance from noise and vibration and human presence on breeding and wintering birds may extend for several hundred metres from the Proposed Project.	The Lower River Shannon, Parteen Basin, Lough Derg, and suitable habitats favoured by target bird species within a 2km buffer of the Proposed Project, along the route of the Treated Water Pipeline and the 38 kV Uprate Works (see Appendix A8.21: Breeding Bird Surveys Summary Report; and Appendix A8.22: Winter Bird Surveys Summary Report), for further details on the ornithological study areas).
	Breeding birds (Other Species of Low Conservation Concern)		
	Wintering birds (Key Species of Conservation Concern)		
	Wintering birds (Other Species of Low Conservation Concern)		

8.2.3 Relevant Guidelines, Policy and Legislation

29. This chapter was prepared in accordance with the following policy and legislation (any references to legislation include any amendments thereto):
- The EIA Directive
 - Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, hereafter referred to as the Habitats Directive
 - Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds, hereafter referred to as the Birds Directive
 - European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) (as amended)
 - Planning and Development Acts 2000 (as amended), hereafter referred to as the Planning Acts
 - European Union (EU) Water Framework Directive (2000/60/EC) (WFD)
 - Wildlife Acts 1976 to 2021, hereafter referred to as the Wildlife Acts
 - Flora Protection Order (FPO), 2022 (S.I. No. 235 of 2022)
 - Inland Fisheries Acts 1959 to 2017, hereafter referred to as the Fisheries Acts
 - Bird species of medium and high conservation concern listed in the publication Birds of Conservation Concern in Ireland (BoCCI) 2020 – 2026
 - Objectives relevant to ecology and biodiversity in the latest Local and County Development Plans of the relevant counties crossed or potentially impacted by the Proposed Project
 - Irish Water's Biodiversity Action Plan – Embedding Biodiversity into Water Services. Spring 2021
 - Water Action Plan 2024: A River Basin Management Plan for Ireland (Department of Housing, Local Government and Heritage (DHLGH) 2024)
 - Ireland's 4th National Biodiversity Action Plan 2023 – 2030 (Government of Ireland).
30. This chapter was also prepared with regard to the following guidelines, where relevant. This is not an exhaustive list of all guidelines (e.g. receptor specific guidelines are presented in Section 8.3), but the most relevant ones for the purposes of preparing this chapter of the EIAR:
- Environmental Impact Assessment of Projects, Guidance on the Preparation of the Environmental Impact Assessment Report (European Commission 2017)
 - Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022)
 - Guidelines for Ecological Impact Assessment in the United Kingdom (UK) and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM 2018)
 - Environmental Guidelines Series for Planning and Construction of National Roads (National Roads Authority (NRA) 2006 to 2014)
 - Guidelines for Assessment of Ecological Impacts of National Roads Schemes (NRA 2009a)
 - Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA 2009b)
 - Guidelines for the Strict Protection of Animal Species of Community Interest Under the Habitats Directive (European Commission 2021)
 - Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government (DHPLG) 2018).

8.2.4 Data Collection Methods – Desktop Review

8.2.4.1 Desktop Review

31. As part of the assessment of the Proposed Project, a desktop review of available online databases was carried out (most recently in 2025) to identify potential ecological constraints. The following databases were consulted to retrieve ecological data:
32. General:
 - Habitat and species (e.g. Annex I Habitats) and data request such as freshwater pearl mussel and kingfisher (*Alcedo atthis*)
 - GIS datasets provided by the NPWS (data downloaded and/or received between 2016 and 2025)
 - Information on the status of EU protected habitats and species in Ireland (NPWS 2019a; 2019b; 2019c)
 - Review of Ordnance Survey Ireland mapping (www.osi.ie) and aerial photography (Google Maps, Bing Maps, Lidar Mapping³, Oblique Imagery⁴) for the Proposed Project and its environs
 - National Biodiversity Data Centre (NBDC), records and mapping for the following 10km grid squares 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 2025a) (i.e. species distribution data recorded within 10km square grid references on a map)
 - Environmental information/data from Envision Online Environmental Map Viewer (<https://gis.epa.ie/EPAMaps/>).
33. Designated Areas of Nature Conservation:
 - Online data available on European sites, including habitat and species Geographic Information System (GIS) datasets, and conservation objectives (and supporting) documents, as held by NPWS (NPWS 2025a)
 - Natural Heritage Areas (NHAs) and proposed NHAs boundary data and site synopses information, as held by NPWS (NPWS 2025b)
 - Ramsar Sites in Ireland (<http://irishwetlands.ie/irish-sites/>)
 - Nature Reserves in Ireland (<https://www.npws.ie/nature-reserves>).
34. Terrestrial Ecology:
 - National bat database held by the NBDC (as previously outlined)
 - Bat Conservation Ireland (BCIreland) database of roost records, ad hoc detector records and transects surveys
 - In accordance with available literature and best practice guidelines (Bellamy and Altringham 2015; Boughey *et al.* 2011; Lundy *et al.* 2011; and NRA 2006a) a desktop review of a 10km buffer zone around the Proposed Project (greater than the 3km desk study area recommended in the 'Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes' (NRA 2006a), to ensure wider landscape effects were considered) was undertaken to identify any areas or structures of potential value to bats. Key criteria which are known to influence the distribution of bats, such as complex woodlands, water, roads, and buildings (Bellamy *et al.* 2012; 2013; Walsh and Harris 1996; Roche *et al.* 2014) were used to characterise the Proposed Project into areas of low, moderate and high habitat suitability 'Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd and 4th edition)' (Collins 2023)

³ Lidar is an acronym for Light Detection and Ranging – it is a remote sensing method used to examine the surface of the Earth (<https://data.gov.ie/dataset/open-topographic-lidar-data>)

⁴ Oblique Imagery is aerial photography that is collected at an angle, usually downward at a 40° to 50° angle to the ground (<https://www.bluesky-world.ie/metrovista>)

- All known records of bat presence within a 10km buffer zone around the Proposed Project were obtained from BCIreland
- All known records of protected fauna presence within the 10km grid squares surrounding the Proposed Project were obtained from the NBDC and/or NPWS in order to identify potential ecological constraints to aid the assessment and identification of the Proposed Project (most recent data requested and received in 2025)
- Department of Agriculture Badger Setts of Ireland Database (data request from Department of Agriculture Food and Marine (DAFM); most recent data requested and received in 2025).

35. Aquatic Ecology:

- Water Action Plan 2024: A River Basin Management Plan for Ireland (DHLGH 2024)
- Environmental Protection Agency (EPA) (www.catchments.ie)
- ESB River Shannon Fisheries Data from 1960 to 2022
- Water Framework Directive Ireland Database (www.wfdireland.ie). Note, a WFD Assessment Report for the Proposed Project has been submitted with the Strategic Infrastructure Development planning application
- Inland Fisheries Ireland (IFI) – data requests/consultation, project survey data and IFI website.

36. Ornithology – Breeding and Wintering Birds:

- A desktop review of published (including bird atlas records) and unpublished literature and existing datasets (records held by the NBDC, NPWS (breeding curlew (*Numenius arquata*)) data) and BirdWatch Ireland (BWI) Irish Wetland Bird Surveys (I-WeBS) data) was undertaken for key species of conservation concern
- Data request to the Irish Hen Harrier Winter Survey group for wintering hen harrier roost sites
- Data request to the University College Cork for breeding woodcock (*Scolopax rusticola*) survey data.
- Data request to BirdWatch Ireland for breeding records of barn owl along the Proposed Project and within the Zol.

37. A literature review was conducted with regard to wintering birds that are known to occur within the study area. In particular, up to date detailed information available on sensitive wintering bird distribution in Balmer *et al.* (2013), and population estimates available in Burke *et al.* (2018) were considered, as well as extensive detailed information available on key wintering bird sites in Crowe and Boland (2012). This information was reviewed to identify key sites ('international', 'national' and 'notable/regional importance') where field surveys should be focused. In addition, bird count data for Lough Derg for the winters 2009/2010 and 2010/2011 were made available by NPWS, and data from 2012/2013 up to 2024/2025 were made available by BWI, and reviewed and considered to inform the assessment.

38. The results of the desktop review were used to identify ecological features within the study area for the Proposed Project and inform the detailed field surveys. Relevant environmental data gathered during the desktop review were collated and also used to assist with the ecological assessment and evaluation; however, no impact assessments were made or conclusions drawn based upon the results of the desktop studies alone, with the exception of areas for which land access was not permitted.

8.2.5 Field Survey Methods

39. A number of field surveys were undertaken as part of multidisciplinary walkover surveys for the Proposed Project and previous iterations of the project between 2016 and 2025. These included habitat mapping and evaluation and surveys to detect the presence, or likely presence, of a range of protected species (NRA 2009b). From these multidisciplinary walkover surveys, it was possible to refine the scope of any further surveys, restrict follow-up surveys to selected habitats, features or locations, and to underpin the selection of KERs⁵. The surveys undertaken as part of the multidisciplinary walkover and subsequent target or species-specific surveys, are described herein.
40. Surveys undertaken for previous iterations of the project remain valid for the Proposed Project as the alignment remains the same in many instances.

8.2.5.1 Terrestrial Ecology

8.2.5.1.1 Habitats and Flora

41. Habitat surveys were undertaken during the optimal survey season in accordance with the Heritage Council's Best Practice Guidance for Habitat Survey and Mapping (Smith *et al.* 2011). Habitats 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 2013). A review of aerial photography of the study area assisted with habitat delineation and interpretation. Plant identification and nomenclature principally followed Stace (2019), Parnell *et al.* (2012) and Rose (1989). Predominant plant species were recorded to determine accurately the types of habitats present in the study area. Invasive non-native plant species were also recorded during habitat surveys.
42. Habitat surveys were conducted for the Proposed Project and previous iterations of the project (which are still relevant) between 2016 and 2025 as outlined in Table 8.5. 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.

⁵ According to the NRA (2009a) guidelines, KERs are ecological features of sufficient value to be material in the decision-making process for which potential impacts are likely. Therefore, KERs are defined as features of local (higher value), county, national, or international importance.

Table 8.5: Summary of Habitat Surveys

Locations	Survey Area	Dates of Surveys									
		May and Jun 2016	Jul and Aug 2017	Jun to Oct 2018	Jun 2019	Jul to Oct 2020	Jul to Oct 2021	Jun to Sep 2022	Jun 2023	Jun to Oct 2024	May and Jun 2025
RWI&PS	The footprint of the Proposed Project (i.e. the iteration at the time of survey) 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 Peamont 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-routed sections)*
Treated Water Pipeline from the BPT to the TPR		✓	✓ (re-routed sections)*	✓	—	✓	✓	✓	✓ (re-routed sections)*	✓	✓ (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 to 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.

43. Detailed botanical surveys for the Proposed Project and previous iterations of the project were carried out between 2017 and 2024 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). The RWI&PS and WTP were also surveyed for fungi, lichen, and bryophytes at the request of NPWS. It should be noted, these sites were not considered to be sensitive habitats for rare or protected fungi, lichen, or bryophytes, nor were any other sensitive habitats for these species identified within the Zol of the Proposed Project. Botanical surveys are summarised in Table 8.6.

44. During the detailed Botanical Surveys, additional relevé (vegetation plot) data were collected. The methodologies for each of these surveys are provided in Appendix A8.4 (Target Habitat Surveys Report), Appendix A8.2 (Assessment of the Woodland Near Parteen Weir), Appendix A8.1 (Parteen Habitat Assessment), Appendix A8.3 (Site Description of Coagh Upper Fen, County Offaly), Appendix A8.6 (Fungi Survey Report), Appendix A8.7 (Lichen Survey Report), Appendix A8.8 (Bryophyte Survey Report) and Appendix A8.5 (Rare Plants Survey Report). 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 8.5), or where changes to the route of the Proposed Project resulted in sites being no longer situated within the Zol.

Table 8.6: Summary of Detailed Botanical Surveys

Locations	Survey Area	Dates of Surveys											
		Jun 2016	Aug 2016	Mar 2017	Jun 2017	Aug 2018	Aug 2019	Aug 2020	Sep 2021	Aug 2022	May & Jun 2023	Aug 2024	Jun 2025
RWI&PS	The footprint of the Proposed Project	✓	—	—	—	—	—	✓	—	—	—	—	—
WTP		—	—	—	✓	—	—	✓	—	—	—	—	—
BPT		—	—	—	✓	—	—	—	—	—	—	—	—
BPS		—	—	—	—	—	—	—	—	—	—	—	—
FCV		—	—	—	—	—	—	—	—	—	—	—	—
TPR		—	—	—	✓	—	—	—	—	—	—	—	—
RWRMs		—	—	—	—	—	—	—	—	—	—	—	—
Treated Water Pipeline from the WTP to the BPT	Various habitats of potential national importance or greater within the Zol along the Treated Water Pipeline.	—	—	—	✓	✓	—	—	—	✓	✓	—	—
Treated Water Pipeline from the BPT to the TPR		—	—	—	✓	✓	—	—	—	—	—	✓	—
Sites of Interest within the Potential Zol of the Proposed Project (note: some of these sites were surveyed to inform the Proposed Project route)	Coagh Upper Fen, County Offaly	✓	—	—	—	—	✓	—	—	—	—	—	—
	Ponds near Lough Ourna 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	—	—	✓	✓	—	—	—	✓	—	—	—	—
	Grassland West of Ashley Park	—	—	—	✓	—	—	—	—	—	—	—	—
	Grasslands at the N52 Crossings	—	—	—	✓	—	—	—	—	—	—	—	—
	Killananny Bog Woodland	—	—	—	✓	—	—	—	—	—	—	—	—
	Reask Woodland	—	—	—	✓	—	—	—	—	—	—	—	—

Locations	Survey Area	Dates of Surveys											
		Jun 2016	Aug 2016	Mar 2017	Jun 2017	Aug 2018	Aug 2019	Aug 2020	Sep 2021	Aug 2022	May & Jun 2023	Aug 2024	Jun 2025
Sites of Interest within the Potential ZOI of the Proposed Project (note: some of these sites were surveyed to inform the Proposed Project route)	Rathlumber Woodland	—	—	—	✓	—	—	—	—	—	—	—	—
	Ballynakill Bog Woodland	—	—	—	✓	—	—	—	—	—	—	—	—
	Cushaling Peatland (a)	—	—	—	✓	—	—	—	—	—	—	—	—
	Drummond Woodland	—	—	—	✓	—	—	—	—	—	—	—	—
	Timahoe East Peatland and Woodland	—	—	—	✓	—	—	—	—	—	—	—	—
	Timahoe East Scrub	—	—	—	✓	—	—	—	—	—	—	—	—
	Timahoe East Woodland	—	—	—	✓	—	—	—	—	—	—	—	—
	Timahoe East Peatland and Grassland (b)	—	—	—	✓	—	—	—	—	—	—	—	—
	Derryvaroge Peatland	—	—	—	✓	—	—	—	—	—	—	—	—
	Cushaling Bog Woodland	—	—	—	✓	—	—	—	—	—	—	—	—
	Mountpellier Grassland	—	—	—	—	—	—	✓	—	—	—	—	—
	Coolfin Glebe Transition Mire, County Offaly	—	—	—	—	—	✓	—	—	—	✓	—	—
	Breaghmore Grassland, County Offaly	—	—	—	—	—	✓	—	—	—	—	—	—
	Rathmore Spring, County Offaly	—	—	—	—	—	✓	—	—	—	—	—	—
	Raheenduff Fen, County Offaly	—	—	—	—	—	—	✓	—	—	—	—	—
	Lough Ourna, Nenagh, County Tipperary	—	—	—	—	—	—	—	✓	—	—	—	✓
	Derryvaroge, Cloona, County Kildare	—	—	—	—	—	—	—	✓	✓	—	—	—
	Coologmartin, Cloona, County Kildare	—	—	—	—	—	—	—	✓	—	—	—	—
38 kV Uprate Works	The footprint of the 38 kV Uprate Works	—	—	—	—	—	—	✓	✓	—	✓	—	—

8.2.5.1.2 Mammals

8.2.5.1.2.1 Bats

45. An array of bat surveys were conducted along previous iterations of the project between 2016 and 2018 by TOBIN (to assess habitats and structures with bat roost potential within the study area) 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 in accordance with 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, derogation licences and mitigation measures. While a 4th edition of the survey guidelines was published in September 2023, this report, for accuracy, will refer 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.
46. 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. A summary of the various surveys undertaken is provided hereunder. Further details are outlined in a full report in Appendix A8.9 (Bat Surveys Report).

Daytime Inspection Surveys

47. 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. The definition of roost types in this report is based on Table 8.7 and Table 8.8 which have been taken from Collins (2016).

Table 8.7: Bat Roost Types (Collins 2016)

Roost Type	Definition	Time of Survey
Day roost	A place where individual bats or small groups of males, rest or shelter in the daytime but are rarely found by night in the summer.	Any time of the year
Night roost	A place where bats rest or shelter in the night but are rarely found in the day. May be used by a single bat on occasion or it could be used regularly by the whole colony.	Any time of the year
Feeding roost	A place where individual bats or a few bats rest or feed during the night but are rarely present by day.	Any time of the year
Transitional roost	A place used by a few individuals or occasionally small groups for generally short periods of time on waking from hibernation or in the period prior to hibernation.	Outside the main maternity and hibernation periods
Swarming site	Where large numbers of males and females gather. Appear to be important mating sites.	Late summer and autumn
Mating site	Where mating takes place.	Late summer and autumn
Maternity site	Where female bats give birth and raise their young to independence.	Summer months

Roost Type	Definition	Time of Survey
Hibernation site	Where bats are found, either individually or in groups in the winter months. They have a constant cool temperature and humidity.	Winter months in cold weather conditions
Satellite roost	An alternative roost found in close proximity to the main nursery colony and is used by a few individuals throughout the breeding season.	Summer months

Table 8.8: Bat Roost Suitability (Collins 2016)

Suitability	Description	
	Roosting Habitats	Commuting and Foraging Habitats
Negligible	Negligible habitat features on-site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain potential roost features (PRFs) but with none seen from the ground or features seen with only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or un-vegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, treelined watercourses and grazed parkland. Site is close to and connected to known roosts.

Tree Potential Bat Roost Inspection Surveys

48. Trees that may provide a roosting space for bats were classified using the Bat Tree Habitat Key (BTHK 2018) and the classification system from Collins (2016) (Table 8.9). 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.
49. 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 search for PRFs.

Table 8.9: Tree Bat Roost Category Classification System (from Collins 2016)

Tree Category	Description
1 High	Trees with multiple, highly suitable PRFs capable of supporting larger roosts.
2 Moderate	Trees with definite bat potential but supporting features (PRFs) suitable for use by individual bats.
3 Low	Trees have no obvious potential although the tree is of a size and age such that elevated surveys may result in cracks or crevices being found; or the tree supports some features (PRFs) which may have limited potential to support bats.
4 Negligible	Trees have no potential.

Buildings and Structure Inspection Surveys

50. 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).
51. Buildings were also assessed to determine their suitability as a bat roost during daytime inspections and described using the parameters Negligible, Low, Moderate or High suitability (Table 8.8). The level of suitability, coupled with any potential evidence of bat usage, 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, survey results were still considered robust and suitable to adequately inform the assessment, based upon professional judgement.
52. Stone structures and bridges were assessed using a four-point classification system designed for bridges by Billington & Norman (1997) as outlined in Table 8.10. Due to the fact that bat usage of such structures can often be more transient in comparison to buildings and due to the fact that evidence of bat usage is less likely to remain (e.g. droppings from bats roosting in an archway of a bridge over a river are likely to be washed away), this classification provided additional information to daytime assessments.

Table 8.10: Bridge and Stone Structure Bat Roost Classification System (from Billington & Norman 1997)

Bridge Category	Description
0	No potential (i.e. no suitable crevices for roosting bats).
1	Low potential (i.e. crevices present that may be of use to bats).
2	High potential (i.e. crevices ideal for roosting bats but no evidence of usage during inspections).
3	Roost (evidence of bats roosting either because bats are present or other evidence is recorded during inspection (e.g. bat droppings)).

Dusk and Dawn Bat Detector Surveys

53. 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.
54. 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 during dawn surveys:
- 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.

Walking Transect Surveys

55. Walking transects were completed post dusk emergence surveys and involved the surveyor(s) walking the study area, noting the time, location and bat species encountered. Walking transects were generally completed along boundaries of fields (i.e. linear features along the Proposed Project), laneways etc., surrounding the buildings surveyed/inspected to gather information on the distribution of foraging and/or commuting bats within the landscape of the study area. Bat activity was recorded using full spectrum bat detectors and all bats encountered were mapped. Driving transects were undertaken for large study areas (i.e. the road network along and intersecting the Proposed Project) to document the suite of bat species present within the landscape of 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 driving transects started 40 minutes after sunset and 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.

Passive Static Bat Detector Surveys

56. 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 using 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. Additional habitats outside the Proposed Project were sampled for a minimum of one night (e.g. adjacent woodlands) to gather data on bat species present in the wider landscape. The length of the static surveillance was determined by the duration of landowner access provided (permission was granted from Monday to Friday in a specified week,

therefore deployment of static units was undertaken on the Monday/Tuesday and collected on Friday providing a three or four night surveillance period).

57. 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.
58. 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 (two-dimensional 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.

8.2.5.1.2.2 Eurasian Badger

59. Field sign badger surveys (i.e. field searches for evidence) were conducted within the study area of the Proposed Project in accordance with 'Ecological Surveying Techniques for Protected Flora and Fauna During the Planning of National Road Schemes' (NRA 2009b). Field signs of badger activity are characteristic and sometimes quite obvious and can include tufts of hair caught on barbed wire fences and scrub, conspicuous badger paths, footprints, small excavated pits or latrines in which droppings are deposited, scratch marks on trees, and snuffle holes, which are small scrapes where badgers have searched for insects and plant tubers. Searches for badger setts were also carried out and the sett type and activity status of identified setts were noted, as per Harris *et al.* (1989).
60. Table 8.11 summarises the badger surveys undertaken. The optimal survey period for protected mammals such as badger is November to April when there is less vegetation (NRA 2009b); however, these surveys can still be completed during the sub-optimal period of May to October.

Table 8.11: Summary of Badger Surveys

Timing of Surveys	Areas Surveyed
Between May and July 2016	Suitable habitat within the RWI&PS, WTP, BPT and TPR and along the 'Preferred 200m Pipeline Corridor' at the time.
July and August 2017	Sections of the route where design changes had occurred since 2016 and locations where badger activity was recorded in 2016 were surveyed in 2017. Where active setts 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, badger 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	Badger 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).
June 2019	Badger 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).
Between September and November 2019	Sections of the route where badger activity was recorded in 2018 were surveyed in 2019. Where active setts 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.
Between July and October 2020	In order to maintain validity of the baseline data, badger surveys were repeated in 2020. Surveys were carried out along a previous iteration of the project as well as a 75m 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) were surveyed in 2021. Where active setts 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.

Timing of Surveys	Areas Surveyed
Between July and October 2022	A previous iteration of the project was resurveyed in 2022. New setts were recorded, or existing setts verified. Where active setts 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.
June 2023	Areas of the Proposed Project which could not be accessed in previous years were surveyed in 2023. New setts were recorded, or existing setts verified. Where active setts 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.
Between June and October 2024	The Proposed Project was surveyed in 2024. New setts were recorded, or existing setts verified. Where active setts 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. In areas where piling is proposed through peat areas, the study area was extended to a 150m buffer around the Proposed Project.
June 2025	Areas of the Proposed Project which could not be accessed in previous years were surveyed in 2025. New setts were recorded, or existing setts verified. Where active setts 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.

Otter

61. Otter surveys were conducted in accordance with 'Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes' (NRA 2009b). 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.
62. Table 8.12 summarises the otter surveys undertaken. The optimal survey period for protected mammals such as otter is any time of the year, but dense vegetation (especially in summer) can reduce success in the identification of otter holts or couches (NRA 2009b).

Table 8.12: 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 200m 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 potential 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).

Timing of Surveys	Areas Surveyed
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.
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.

8.2.5.1.2.3 Other Mammal Species

63. During multidisciplinary walkover surveys between 2016 and 2025, suitable areas of habitat that might support other protected mammals were recorded, in addition to recording any field signs such as well-used pathways, droppings, places of shelter and features or areas likely to be of particular value as foraging resources. No species-specific surveys were undertaken for other protected mammal species for which field signs are less frequent and/or reliable than other larger mammals, such as pine marten, hedgehog, red squirrel, Irish stoat and Irish hare.

8.2.5.1.3 Invertebrates

8.2.5.1.3.1 Lepidoptera Surveys

64. A multidisciplinary walkover survey was carried out in June 2016 along a previous iteration of the project to identify areas of potentially suitable habitat for the marsh fritillary butterfly. Suitability of the habitats for marsh fritillary was assessed according to the following categories, which provide an approximate gradation of habitat suitability (from highly suitable to not suitable): 'Good condition'; 'Suitable, under-grazed'; 'Suitable, overgrazed'; 'Suitable, sparse'; 'Overspill'; 'Potential, rank'; 'Not suitable'. The assessment was based upon percentage of purple moor-grass and devil's-bit scabious (*Succisa pratensis*), scrub cover, sward height and presence of tussocks (Fowles 2003). Survey methodology followed the UK Butterfly Conservation Monitoring Scheme Methodology for Marsh Fritillary Larval Webs (UKBMS 2019). Dedicated surveys were subsequently carried out for this species because they are legally protected (i.e. are listed on Annex II of the Habitats Directive) and are rare in Ireland (Regan *et al.* 2010) and at particular risk of habitat loss impacts associated with the Proposed Project.

65. Targeted marsh fritillary surveys were undertaken by conducting larval and habitat suitability surveys during the optimum survey period (August and September) in areas of potentially suitable habitat or in the area of a known record within the study area of the Proposed Project and previous iterations of the project (where land access was granted) between 2016 and 2024 (with the exception of 2021 and 2023). Larval surveys were carried out in sunny conditions, when colonies of individuals are known to construct conspicuous webs over devil's-bit scabious leaves and adjacent vegetation. The study areas surveyed for marsh fritillary between 2016 and 2024 are shown on Figure 8.109 to Figure 8.212.
66. In addition to marsh fritillary surveys, general walkover surveys for lepidoptera (butterflies and moths) were undertaken at the RWI&PS and the WTP sites, following a consultation request from NPWS, to assess the entomological component of their biological diversity (Appendix A8.10: Lepidoptera Survey Report). The surveys were undertaken by a specialist ecologist, Dr. Ken Bond (Ireland's leading authority on lepidoptera, having spent almost 40 years surveying and recording moths and butterflies for all counties in Ireland). The woodland and its grassy and riverine margins at the WTP site were surveyed in August 2020. In addition to adult insects, immature stages were recorded from leaf-mines on their respective foodplants. A similar survey followed at the RWI&PS site in August 2020. Actinic traps (15W) were placed at both sites overnight and visited the following morning to record captured specimens. No suitable habitat for rare or protected lepidoptera species was recorded at either site. Thus, repeat surveys were not required due to the lack of potential for rare or protected lepidoptera species.

8.2.5.1.3.2 Mollusc Surveys

67. During habitat surveys (Section 8.2.5.1.1) areas of potentially suitable habitat for legally protected terrestrial molluscs (i.e. the three Habitats Directive Annex II-listed whorl snails (narrow-mouthed whorl snail (*Vertigo angustior*), Geyer's whorl snail (*Vertigo geyeri*), and Desmoulin's whorl snail (*Vertigo moulinsiana*)) were identified. Dedicated surveys for the presence of whorl snails were subsequently undertaken in July 2020. The study area for this survey comprised six wetland areas along the Proposed Project: Derrycrib, County Kildare; and Raheenduff, Annaghmore, Coolfin Glebe, Pass and Derrinclare, County Offaly (Appendix A8.11: Vertigo Survey Report). Surveys were not repeated at these sites as no suitable habitat was found, and/or no signs of the target *Vertigo* species (Section 8.3.2.7).
68. The sampling methodology followed that used in the National Vertigo Monitoring Project (Long & Brophy 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.
69. 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 Desmoulin's whorl snail, the most suitable vegetation found within the site 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 narrow-mouthed whorl snail and Geyer's whorl snail, 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. A handheld computer and GPS (Nomad Trimble) running ArcPad 8.0 was used to navigate within the study area and to record data in the field.

70. In addition to the dedicated *Vertigo* surveys, general walkover surveys for molluscs were undertaken at the RWI&PS and the WTP sites, following a consultation request from NPWS (Appendix A8.12: Parteen Basin Mollusc Survey Report and Appendix A8.13: Water Treatment Plant Mollusc Survey Report). Mollusc surveys were undertaken at the RWI&PS and the WTP sites in September 2020 and October 2021 in order to characterise the sites from an invertebrate perspective and assess the likelihood of the sites holding designated or notable species. Snails are generally more numerous and more likely to be in adult form later in the year, so an October survey date was optimal. Weather conditions were favourable for survey work of this kind with mostly dry conditions and moderate temperatures.
71. Searching was undertaken by sweep-netting the field and shrub layers and searching through moss and grass tussocks with a tray and sieve. Robust vegetation e.g. gorse and lower branches of trees were tapped onto a white tray for inspection. Sweep-netting involved using a net for invertebrates on stiff foliage by sweeping the net vigorously through vegetation to capture specimens. Dead rotten wood was broken up into a white tray and carefully examined. These methods broadly followed the survey methodologies development by Moorkens and Killeen (2011).
72. Where possible, specimens were identified in the field and released. Those requiring microscope examination or identification using a key were taken away for later study.

8.2.5.1.4 Other Species Groups

8.2.5.1.4.1 Reptiles and Amphibians

73. Common frog, smooth newt and common lizard are all protected species under the Wildlife Acts and have a widespread distribution in Ireland. Each of these species is likely to occur in suitable habitats throughout the Proposed Project. Natterjack toad is also protected under the Wildlife Acts but its distribution is restricted to County Kerry and County Wexford. Pools, ponds, drainage ditches and wet grasslands provide habitat for amphibians, while the common lizard is widespread in habitats such as dry banks, heathland and bog. Visual sightings and signs of these species as well as potential breeding habitats were searched for and recorded where present during all multidisciplinary walkover surveys. The presence of these species and/or suitable habitat within the study area was established and informed the assessment and proposed mitigation measures.

8.2.5.2 Aquatic Ecology

74. All water bodies which could be affected directly or indirectly by the Proposed Project (either as a result of a proposed crossing or Washout Valve, as described in Chapter 5: Construction & Commissioning) 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 during the optimal survey seasons (typically between May and September for River Hydromorphology Assessment Techniques [RHAT]) between 2016 and 2024 (with the exception of 2023, due to project programme at the time; this is not considered a limitation as aquatic surveys were conducted in the years prior to and following 2023). 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 A8.14 (Watercourse Crossing Data) and the locations of these sites are shown in Figure 8.4 to Figure 8.108, while temporary and permanent Washout Valve locations are listed in Table 8.78 and Table 8.79.

75. 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 rare/protected/notable aquatic species. Ideally, the optimum period to conduct macroinvertebrate assessments is 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.
76. Due to landowner access restrictions, sampling could only be carried out at sites within the landowner folios (i.e. registered land) with access granted. However, where land access was restricted, watercourses were sampled downstream of the Proposed Project from public roads which allowed such watercourses to be adequately evaluated for the purpose of this assessment. The level of survey effort undertaken at each watercourse crossing is provided in Appendix A8.14 (Watercourse Crossing Data).

8.2.5.2.1 *Aquatic Habitats and Plant Communities*

77. The EPA and the Northern Ireland Environment Agency (NIEA) collectively developed a Rapid Assessment Technique (RAT) to allow for in-field assessment and classification of rivers in terms of their hydromorphology. The RAT methodology was modified by the NIEA to meet more practical application requirements and was renamed as the RHAT (NIEA 2014); taking into consideration the river habitat survey methodology outlined in the 'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003 Version' (UK Environment Agency 2003).
78. The RHAT methodology allows for the characterisation and evaluation of watercourses under the requirements of the EU Water Framework Directive (WFD; EC/60/2000), i.e. a High, Good, Moderate, Poor, or Bad WFD status based on semi-qualitative and quantitative criteria. The RHAT methodology was generally employed as an aquatic habitat assessment tool for all watercourses potentially impacted by the Proposed Project (Appendix A8.14: Watercourse Crossing Data). Instead of a RHAT 500m survey reach, the survey focused on the crossing point (i.e. stretch of watercourse within the Proposed Project) as well as 75m to 150m upstream and downstream of the crossing point (where access permitted) as the study area, which was informed by the Zol (e.g. study area was 75m upstream and downstream where watercourses were found to be dry, channelised, uniform, and/or heavily vegetated drainage ditches with no potential for protected species, but was increased to 150m where suitable habitat for protected species occurred). 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
 - In-stream vegetation/plant communities
 - 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.

79. The results of the aquatic habitat assessment were used to assess habitat suitability for protected aquatic species. Stream order was also described using the classification system in Strahler (1957) which defines stream size based on a hierarchy of tributaries (with first-order streams being the smallest).

8.2.5.2.2 Aquatic Macroinvertebrates

80. 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 conditions for kick sampling (e.g. peat substrate), dry and/or heavily vegetated watercourses, or access restrictions (e.g. too deep to safely wade, or fenced off, or surrounded by thick vegetation) (Appendix A8.14: Watercourse Crossing Data) (Section 8.2.9). These watercourses were, however, still subject to fisheries assessment visual surveys, as described herein. In total, 48 watercourses were kick sampled. Kick sampling involved the use of 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 and live-sorted on the riverbank and identified to the level required to assign a Q-rating score.
81. The biological assessment procedure used by the EPA, which is based on a biological river quality (Q or biotic index) classification system (Toner *et al.* 2005), was used to infer a water quality rating for each site. The EPA Quality Rating (Q-value) System is based on the well-established sensitivities, abundance and diversity of macroinvertebrates and their relation to water quality. The changes brought about by organic pollution in the bottom dwelling (benthic) macroinvertebrate community in rivers are particularly well documented. These changes are due to the varying sensitivities of the different components of the community to the stresses caused by pollution. It is well documented that community diversity declines in the presence of pollution and more tolerant forms progressively replace sensitive species as the level of pollution increases. The Q-value System has been used to assess the water quality of Irish rivers since 1971. It has provided the primary basis for mapping long-term trends of water quality in Irish rivers by the EPA. For the purposes of the Irish assessment procedure, benthic macroinvertebrates are divided into five indicator groups ranging from the most disturbance-sensitive taxa to the most insensitive taxa, as follows:
- Group A, the sensitive forms
 - Group B, the less sensitive forms
 - Group C, the tolerant forms
 - Group D, the very tolerant forms
 - Group E, the most tolerant forms.
82. The Q-value assigned to a site depends on, inter alia, the degree of departure of the river fauna's taxonomic composition, diversity and abundance from its reference condition at close to natural undisturbed conditions. A Q-value of Q5 indicates that conditions are close to reference conditions whereas a Q-value of Q1 indicates the presence of serious pollution. The Q-value employs the ratio of disturbance-sensitive to insensitive taxa to indicate the degree or extent of change from the natural reference conditions at a site. The Q-value System has been intercalibrated at European level in both the Northern Geographical Intercalibration Group and the Central/Baltic Geographical Intercalibration Group (van De Bund 2009). The relationship between Q-value and Ecological Status for macroinvertebrates is as shown in Table 8.13.

Table 8.13: Relationship between Q-value and Ecological Status for Macroinvertebrates

Q-value*	WFD Status	Pollution Status	Condition**
Q5, Q4-5	High	Unpolluted	Satisfactory
Q4	Good	Unpolluted	Satisfactory
Q3-4	Moderate	Slightly Polluted	Unsatisfactory
Q3, Q2-Q3	Poor	Moderately Polluted	Unsatisfactory
Q2, Q1-2, Q1	Bad	Seriously Polluted	Unsatisfactory

Note:

Source of information: EPA 2017

* These values are based primarily on the relative proportions of pollution-sensitive to tolerant macroinvertebrates (the young stages of insects primarily but also snails, worms, shrimps etc.) resident at a river site. ** 'Condition' refers to the likelihood of interference with beneficial or potential beneficial uses.

83. Considering the proposed location for the RWI&PS is Parteen Basin, a detailed benthic invertebrate survey was carried out at this site 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-P12) in Parteen Basin (Image 8.1). The 12 sites were selected to represent full coverage of Parteen Basin with a particular focus around the RWI&PS site. Three replicate 0.025m² grabs for faunal analysis were taken and analysed along with a fourth sample taken for grain size and organic carbon analysis (loss on ignition). 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 diversity indices were computed:

- Margalef's Species Richness Index, for the number of individuals and species
- Pielou's Evenness Index, to assess maximum possible diversity which could be achieved if all species were equally abundant
- Shannon–Wiener Diversity Index, for the proportion of the total count accounted for by the taxa.

Image 8.1: Location of 12 Benthic Sampling Sites in Parteen Basin in August 2016



Note:

Source of information: Benthic Survey at Parteen Basin 2016, River Shannon by AQUAFAC International Services Ltd.

Stations 1-3 are closest to the Proposed Raw Water Intake Site.

84. In addition to the detailed benthic invertebrate survey in August 2016, subsequent self-contained underwater breathing apparatus (scuba) surveys were undertaken at the RWI&PS site in Parteen Basin in 2017, 2019, 2021 and 2024 during which aquatic macroinvertebrates were recorded (Appendix A8.17: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2017), Appendix A8.18: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2019), Appendix A8.19: Aquatic Invasive Species Survey Report, and Appendix A8.23: Aquatic Invasive Species and Macrophyte Survey at Lough Derg and Parteen Basin) (Section 8.2.5.2.4). Thus, it was no longer considered a requirement to repeat the benthic invertebrate survey for the whole of Parteen Basin, with the exception of monitoring the spread of INNS (Appendix A8.19: Aquatic Invasive Species Survey Report and Appendix A8.23: Aquatic Invasive Species and Macrophyte Survey at Lough Derg and Parteen Basin) (Section 8.2.5.2.4), as macroinvertebrate data was collected at the RWI&PS site during the scuba surveys and impacts outside of this area are not expected to occur.

8.2.5.2.3 Protected Aquatic Species

8.2.5.2.3.1 Atlantic Salmon

85. The potential for the Proposed Project watercourse crossings to support Atlantic salmon was initially informed by the results of a desktop review and an appraisal of the habitat suitability within the watercourse.
86. Atlantic salmon were subsequently surveyed for by visual surveys, dip netting, scuba surveys, and a multi-method fish stock survey of Parteen Basin and Lough Derg. For further details, refer to Section 8.2.5.2.4.

8.2.5.2.3.2 Freshwater Pearl Mussel

87. 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, a fisheries assessment was undertaken at each watercourse crossing (Section 8.2.5.2.4) and potential impacts on salmonids (hosts for freshwater pearl mussel) were considered (Section 8.5.3.3).
88. With regards the Nore freshwater pearl mussel (*Margaritifera durrovensis*), none of the inputting rivers to the River Nore are hydrologically connected to the Proposed Project. Therefore, in the absence of a hydrological pathway between the Proposed Project (source) and the Nore freshwater pearl mussel (receptor), there would be no risk of any potential impacts arising as a result of the Proposed Project reaching the Nore freshwater pearl mussel via hydrological pathways. Therefore, this species has been scoped out of the assessment.

8.2.5.2.3.3 White-clawed Crayfish

89. Due to the scale of the Proposed Project, and significant number of watercourse crossings, trapping and torchlight surveys were not undertaken. An assessment of the occurrence of white-clawed crayfish at the Proposed Project watercourse crossings was instead undertaken by underwater visual observation using bathyscopes or hand-searching, in an upstream direction, which was considered to be robust to determine presence/absence and inform appropriate mitigation measures 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.

8.2.5.2.3.4 Lamprey Species

90. The potential for the Proposed Project watercourse crossings to support lamprey species was initially informed by the results of a desktop review and an appraisal of the habitat suitability within the watercourse.
91. 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.

8.2.5.2.4 Fisheries Assessments

8.2.5.2.4.1 Visual Surveys

92. Many of the watercourses intersected by the Proposed Project were small first-order streams or field drains that could be assessed visually. Other areas where no access was granted were also assessed visually from publicly accessible areas (see Section 8.2.9). The evaluation of watercourses and identification of fish populations also included a review of existing IFI data and consultation with this statutory agency.
93. Each watercourse was rated during the field surveys between 2016 and 2025 (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 salmonids. Assessment of the quality of salmonid spawning habitat, nursery habitat and adult habitat was based on professional expertise, EPA Q-value, 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 up-welling 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.

8.2.5.2.4.2 Dip Netting Surveys

94. Qualitative netting with a standard 1mm mesh D-shaped kick net was carried out at selected sites to check for the presence/absence of small fish. This method was generally employed in drains and very small watercourses. The net was used in a circular motion to intercept small fish sheltering in in-stream vegetation stands and under the bank vegetation overhang.
95. As discussed in Section 8.2.5.2.3, during dip net surveys, silt beds were also examined by hand for lamprey ammocoetes.

8.2.5.2.4.3 Parteen Basin and Lough Derg Fish Stock Surveys

96. 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). 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 Appendix A8.15 (National Research Programme Lakes: Parteen Basin (Lower Lough Derg), Inland Fisheries Ireland Report) and Appendix A8.16 (National Research Programme Lakes 2016: Lough Derg, Inland Fisheries Ireland Report).

97. In addition to this data, more precise and appropriate data for the assessment was subsequently obtained from the scuba surveys undertaken, most recently in August 2024 (as described herein).

8.2.5.2.4.4 Scuba Surveys

98. Scuba surveys of the aquatic environment within the proposed RWI&PS site were carried out in August 2017, August 2019, June 2021 and August 2024. These surveys were carried out by undertaking a series of three transects from the shore to approximately 50m offshore at locations on and in the ZOI of the proposed RWI&PS. 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 Appendix A8.17 (Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2017)), Appendix A8.18 (Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2019)), Appendix A8.19 (Aquatic Invasive Species Survey Report) and Appendix A8.23 (Aquatic Invasive Species and Macrophyte Survey at Lough Derg and Parteen Basin).

8.2.5.2.4.5 Underwater Acoustic Surveys

99. 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 (Appendix A8.20: Underwater Noise Modelling Report).

8.2.5.2.5 Invasive Non-Native Aquatic Species

100. Dedicated studies of invasive non-native aquatic species 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 (*Dreissena polymorpha*) 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).
101. 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 (Appendix A8.19: Aquatic Invasive Species Survey Report). This survey was repeated in August 2024 in order to update the baseline data (Appendix A8.23: Aquatic Invasive Species and Macrophyte Survey at Lough Derg and Parteen Basin).
102. The first basket dredge 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 rigid inflatable boat was used as the survey vessel. Samples were sifted in the water before hauling aboard to remove fine sediments. Samples were then sorted through 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 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 Appendix A8.19 (Aquatic Invasive Species Survey Report). 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.

103. In addition, a scuba survey was undertaken at the intake location in August 2024 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. The scuba surveys undertaken in 2017, 2019 and 2021 (Section 8.2.5.2.4) also recorded the presence and abundance of biota including INNS.
104. The presence of invasive non-native aquatic plant species was also recorded during all aquatic surveys, where encountered.

8.2.5.3 Ornithology – Breeding Bird Surveys

105. 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 2020 surveys, which were cancelled due to COVID-19 restrictions, and 2023. 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, 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 study areas selected or old ones discontinued.
106. 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 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). Green and Amber Listed Species of low conservation significance were also recorded on an ad hoc basis during all surveys. Survey methods employed included breeding bird walkover surveys, breeding woodcock surveys, breeding water bird boat surveys, gull (*Larinae* spp.) population counts and Vantage Point (VP) surveys.

8.2.5.3.1 Breeding Bird Walkover Surveys

107. The breeding bird walkover survey method used followed an adapted O'Brien and Smith (1992) method for censusing lowland breeding wader populations. This adapted method was designed 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 the 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. 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 (Table 8.14).

108. 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.
109. The timing of watches was tailored to the ecology of the target species. Recorded field information 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.
110. 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.

Table 8.14: BTO Breeding Bird Codes, Description and Status

Breeding Status Code	Breeding Status Description	Breeding Status
DD	Distraction display	Confirmed breeding
FF	Adults carrying faecal sac or food for young	Confirmed breeding
FL	Recently fledged young/downy young	Confirmed breeding
NE	Nest containing eggs	Confirmed breeding
NY	Nest with young seen or heard	Confirmed breeding
ON	Adults entering/leaving nests or seen incubating	Confirmed breeding
UN	Used nest or eggshells found	Confirmed breeding
A	Agitated behaviour or anxiety calls	Probable breeding
B	Nest building or excavating nest hole	Probable breeding
D	Courtship and display	Probable breeding
I	Brood patch on adult in hand	Probable breeding
N	Visiting probable nest site	Probable breeding
P	Pair observed in suitable nesting habitat in breeding season	Probable breeding
T	Established permanent territory	Probable breeding
H	Suitable nesting habitat	Possible breeder
S	Singing male present in breeding season in suitable breeding habitat	Possible breeder
F	Flying over	Non-breeding
M	Species observed but suspected to be still on migration	Non-breeding
U	Summering non-breeder	Non-breeding

8.2.5.3.2 Breeding Woodcock Surveys

111. During the 2017, 2018, 2019, 2021, 2022, and 2024 breeding seasons woodcock surveys were undertaken in areas of suitable habitat along the Proposed Project and previous iterations of the project. Suitable habitat is defined as woodland of all types and extensive areas of bracken (*Pteridium aquilinum*) in upland areas.
112. The survey methodology followed the recommendations of Gilbert *et al.* (1998) for surveying woodcock. Three survey visits were undertaken between May and June. Surveyors were in position from an hour before sunset until an hour after sunset. The aim of the survey was to record the presence of roding (displaying) male woodcock and thereby establish the distribution and abundance of the species in the study area. Counts of roding woodcock were converted to density estimates. The highest of three densities of roding males provides an index of the peak density of breeding pairs. Some of these surveys were located in habitats that have potential to support owl species, which presented opportunities for surveyors to record ad hoc observations. Evening visits between May and July can be useful in detecting calling juveniles which can prove useful in detecting successful pairs (Hardey *et al.* 2013).

8.2.5.3.3 Breeding Water Bird Boat Surveys

113. 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, as per 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 (Table 8.14). The number of pairs was calculated per visit, with the maximum number of pairs used for comparisons between years.

8.2.5.3.4 Gull Population Counts

114. During breeding bird surveys between 2017 and 2024, where surveyors encountered colony breeding species such as breeding gulls, survey methods were further adapted to ensure the most accurate count data were produced. Assemblages were counted from an elevated VP location, with the surveyor aiming to count the maximum number of individuals and pairs at the site, as per Gilbert *et al.* (1998).

8.2.5.3.5 Vantage Point Surveys

115. VP surveys were undertaken from fixed locations on a monthly basis (six hours per VP per month) from July to September between 2019 and 2024 in order to have full calendar year's bird data (i.e. other breeding bird surveys and winter bird surveys at VP sites covered all calendar year months with the exception of these months).
116. The VP survey methodology broadly followed guidelines issued by the Scottish Natural Heritage (SNH) (2017). Vantage Point surveys aim to quantify the level of flight activity, pattern of use and its distribution over the study area. Vantage Points are fixed locations, which are strategically positioned to provide a maximum viewshed of the study 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 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.

117. The VP surveys at Clarisford Park and Ardclony in County Clare overlooked Parteen Basin and the proposed RWI&PS, while the VP surveys at Kildoorus overlooked the proposed 38 kV Uprate Works where it crosses the Lower River Shannon. For the VP at Kildoorus an additional observation was recorded, noting whether a species was flying above or below the existing OHL. The VP survey locations are shown in Appendix A8.21 (Breeding Bird Surveys Summary Report).

8.2.5.4 Ornithology – Wintering Bird Surveys

118. Wintering bird surveys were conducted between 2015/2016 and 2024/2025 (with the exception of 2021/2022, 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) 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 study areas selected, or old ones discontinued.
119. Survey design and target species selection were undertaken following consideration of the desk 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 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 OHLs as per EirGrid (2020). Green and Amber Listed Species of low conservation significance were also recorded on an ad hoc basis during all surveys. Survey methods employed included VP Surveys, I-WeBS, and hen harrier winter roost surveys.

8.2.5.4.1 Vantage Point Surveys

120. The VP survey methodology was the same during the winter bird season as the breeding bird season (see Section 8.2.5.3.5) 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. Recorded field information 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.
121. For the winter seasons from 2015/16 to 2023/2025 (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. The location of each VP is shown in Appendix A8.22 (Winter Bird Surveys Summary Report). 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 (*Tachybaptus ruficollis*) and mute swan (*Cygnus olor*) 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.

122. 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 location of each VP is shown in Appendix A8.22 (Winter Bird Surveys Summary Report). 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.
123. For the winter season 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 included the RWI&PS, WTP, BPT, BPS, and the 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 Appendix A8.22 (Winter Bird Surveys 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.

8.2.5.4.2 Wintering Water Bird Counts – (I-WeBS)

124. The I-WeBS is an annual monitoring programme which surveys winter water birds across Ireland. The survey runs from September to March each winter. The survey involves conducting monthly counts during the survey season.
125. Monthly I-WeBS 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 Counter Manual – Guidelines for Irish Wetland Bird Survey Counters' methodology 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.
126. 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, 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 Appendix A8.22 (Winter Bird Surveys Summary Report). Survey sites and subsites within the Proposed Project study area were reviewed and some added/removed prior to commencing the 2020/2021 winter surveys. As a result, some locations surveyed from 2015/16 to 2019/20 were no longer included.

127. 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 2019/20 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.
128. 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% of each bird species' national and international populations are listed in Annex D of Appendix A8.22 (Winter Bird Surveys 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).

8.2.5.4.3 Hen Harrier Winter Roost Surveys

129. 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 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.
130. 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. Hen harrier activity continued to be monitored within the study areas between 2022 and 2025 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 Appendix A8.22 (Winter Bird Surveys Summary Report).

8.2.5.5 Summary of Data Collection

131. Table 8.15 provides a summary of the data collection methods employed in the preparation of this chapter and the years in which field surveys were carried out.

Table 8.15: Summary of Data Collection Methods and the Years Surveys Were Undertaken

Ecological Receptor		Desktop Review	Field Surveys	Years of Field Surveys										Notes
				2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
Designated Areas of Nature Conservation		✓	—	—	—	—	—	—	—	—	—	—	—	Various field surveys were undertaken within the Lower River Shannon SAC and the Lough Derg (Shannon) SPA and are considered herein under the various ecological receptors.
Terrestrial Habitats and Flora		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	38 kV Uprate Works habitat surveys were only carried out in 2018, 2019, 2021, 2024 and 2025.
Mammals	Bats	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	✓	✓	38 kV Uprate Works bat surveys only carried out in 2019.
	Eurasian Badger	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	38 kV Uprate Works badger surveys only carried out in 2018, 2019, 2021, 2024 and 2025.
	Otter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	38 kV Uprate Works otter surveys only carried out in 2018, 2019, 2021, 2024 and 2025.
	Other Mammal Species	✓	—	—	—	—	—	—	—	—	—	—	—	No species-specific surveys were undertaken for other mammal species for which field signs are less frequent and/or reliable than other larger mammals; however, observations made during other surveys were noted.
Invertebrates	Lepidoptera	✓	✓	✓	✓	✓	✓	✓	—	✓	—	✓	—	The 2019 surveys included 38 kV Uprate Works only.
	Molluscs	✓	✓	—	—	—	—	✓	✓	—	—	—	—	No mollusc field surveys were carried out for the 38 kV Uprate Works (no suitable habitat identified for KER species).
Other Species Groups	Reptiles and Amphibians	✓	—	—	—	—	—	—	—	—	—	—	—	No species-specific surveys were undertaken for reptiles and amphibians; however breeding habitats were noted where present.
Aquatic Habitats and Flora		✓	✓	✓	✓	✓	✓	✓	✓	✓	—	✓	—	Watercourses identified for permanent Washout Valves were surveyed from 2020 onwards. The 2021 surveys included the RWI&PS site only.

Ecological Receptor		Desktop Review	Field Surveys	Years of Field Surveys										Notes
				2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
Aquatic Fauna	Sea, Brook and River Lamprey, Atlantic Salmon, White-clawed Crayfish	✓	✓	✓	✓	✓	✓	✓	—	✓	—	✓	—	Watercourses identified for permanent Washout Valves were surveyed from 2020 onwards.
Birds	Breeding Birds	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	✓	—	Bird surveys for the 38 kV Uprate Works were only carried out from 2019 onwards. Breeding bird surveys were not undertaken in 2020 due to COVID-19 restrictions, with the exception of VP surveys at Parteen Basin (Clarisford Park and Ardclony VP) and the 38 kV Uprate Works (O'Briensbridge VP) in July, August and September.
	Wintering Birds	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Bird surveys for the 38 kV Uprate Works were only carried out from 2019 onwards. Winter bird surveys were conducted up to March 2025. No winter bird surveys were undertaken from October 2021 to March 2022.

8.2.6 Consultation

132. As part of the scoping process and to inform the impact assessment, consultations were undertaken with the following organisations of particular relevance to biodiversity between 2016 and 2025:
- National Parks and Wildlife Services (NPWS)
 - Inland Fisheries Ireland (IFI)
 - Bord na Móna
 - An Taisce
 - Irish Peatland Conservation Council
 - Environmental Protection Agency (EPA)
 - Waterways Ireland
 - BirdWatch Ireland (BWI)
 - Irish Hen Harrier Winter Survey
 - Bat Conservation Ireland (BCIreland)
 - Butterfly Conservation Group
 - Lough Derg Science Group.
133. Consultation responses from key stakeholders, landowners and the public were reviewed and considered in compiling this chapter. Chapter 2 (The Environmental Impact Assessment Process) of the EIAR sets out the approach the Proposed Project has taken with regard to environmental scoping, in particular the EIAR Scoping Methodology Report (Uisce Éireann 2023a) in respect of the Proposed Project and also the Environmental Impact Statement Scoping Report⁶ (Irish Water 2016) relating to a previous iteration of the project.
134. The scoping consultation responses relevant to biodiversity received from stakeholders are provided in Table 8.16. Further detail on project consultation is included in Chapter 2 (The Environmental Impact Assessment Process) and responses received are in the Water Supply Project Eastern and Midlands Region – Consultation Report, which forms part of the Strategic Infrastructure Development planning application for the Proposed Project. All relevant consultation responses have been considered in preparing this impact assessment.

⁶ As set out in Chapter 2 (The Environmental Impact Process), the Environmental Impact Statement Scoping Report (Irish Water 2016) was based on a previous iteration of the project, however, feedback received from stakeholders informed future scoping and design development and has been considered in this chapter where relevant to the Proposed Project.

Table 8.16: Relevant Scoping Consultation Responses

Consultee	Consultee Response	EIAR Response/Reference
NPWS	The preferred option would 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.	An Appropriate Assessment was carried out in accordance with the provisions of Part XAB of the Planning and Development Act 2010 (as amended) and is provided in a separate report (NIS).
	Determining the extent of the receiving environment, 'study area' or 'Zone of Influence' for surveys, assessment and analysis would 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 hydrodynamic and water quality model would be needed to inform the EIAR and NIS, and the identification of the 'Zone of Influence'.	The ZoI and Study Area are set out in Section 8.2.2. A hydrological model and water quality model were used to analyse the potential effects of the proposed abstraction on daily water levels and water quality within Parteen Basin and Lough Derg and in turn were used to inform the ZoI (Section 8.2.2.1).
	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 construction.	Invasive non-native species were surveyed for during Terrestrial Ecology and Aquatic Ecology surveys. Results are provided in Section 8.3 and mitigation measures are outlined in Section 8.8 to Section 8.10.
	A critical ecological concern is the potential impact of the proposed water abstraction during drought periods, and how water levels would be managed in such circumstances.	A hydrological model and water quality model, which included a "worst-case" drought scenario, were used to analyse the potential effects of the proposed abstraction on daily water levels and water quality within Parteen Basin and Lough Derg (Section 8.2.2.1).
	Ecological impacts resulting from the intake structure including: fish mortality and effects of noise.	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. This information was used to assess the potential impact of each noise source on fish species in Parteen Basin (Section 8.7.3.2).
	The need for a comprehensive ecological survey approach. Habitat survey of the site and surrounds, following Smith <i>et al.</i> (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 Proposed 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. Surveys for biodiversity component groups such as molluscs, lepidoptera, bryophytes, lichens and fungi should be undertaken at the WTP and 'intake works' (RWI&PS), at appropriate times of the year. 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.	Comprehensive ecological surveys were undertaken and are detailed in Section 8.2.

Consultee	Consultee Response	EIAR Response/Reference
NPWS	NPWS extracted records for an area of 5km around the Proposed Project (divided into three categories: 0-1km; 1-3km; 3-5km) for curlews, hen harriers and peregrine falcons (<i>Falco peregrinus</i>). The records were listed by 10km square. Curlew (CU) – records are for breeding pairs; year of record given. Hen harrier (H) – 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. NPWS noted there are no NPWS-owned data available on hen harrier wintering sites for the area of interest.	The information provided was used to inform the site selection for breeding and wintering bird surveys between the October 2019 and April 2021.
	Is the minimum flow rate of 10m³/s compatible with the Qualifying Interests of the Lower River Shannon SAC (2165) achieving favourable conservation status? 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? In the event of a severe drought, how can it be guaranteed that an abstraction rate of >350 million litres per day (ML/day) will not be exceeded due to water shortages in the Midlands and Eastern Region? 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? Parteen Weir likely acts as a large sediment trap. Will there be a need/requirement to clean this for the proposed abstraction? There is also a likelihood of cumulative or in-combination effects arising notably from flood relief and drainage activities on the lower Shannon system. Otter surveys will be required as part of the EIS and/or NIS. A thorough survey for fish, and in particular eels, should be undertaken in Parteen Basin.	An Appropriate Assessment was carried out in accordance with the provisions of Part XAB of the Planning and Development Act, 2010 (as amended) and is provided in a separate report (NIS). This report addresses comments in relation to the favourable conservation status of the Lower River Shannon SAC. A hydrological model and water quality model, which included a "worst-case" drought scenario, were used to analyse the potential effects of the proposed abstraction on daily water levels and water quality within Parteen Basin and Lough Derg (Section 8.2.2.1). Cumulative effects are described in Chapter 21 (Cumulative Impacts Effects & Interactions). Otter surveys were undertaken within the study area of the Proposed Project and are detailed in Section 8.2.5.1. Fish stock surveys were carried out within Lough Derg and Parteen Basin in June and July 2016 (Section 8.2.5.2). Details are provided in Appendix A8.15 (National Research Programme Lakes 2016: Parteen Basin (Lower Lough Derg), Inland Fisheries Ireland Report) and Appendix A8.16 (National Research Programme Lakes 2016: Lough Derg, Inland Fisheries Ireland Report).
IFI	Relevant and appropriate protocols for the control of INNS in any construction works must be observed.	Mitigation measures are outlined in Section 8.8 to Section 8.10.
	A fish stock survey of Parteen Basin would be beneficial to the impact assessment.	Fish stock surveys were carried out within Lough Derg and Parteen Basin in June and July 2016. Details are provided in Appendix A8.15 (National Research Programme Lakes 2016: Parteen Basin (Lower Lough Derg), Inland Fisheries Ireland Report) and Appendix A8.16 (National Research Programme Lakes 2016: Lough Derg, Inland Fisheries Ireland Report).
	In-stream works (in fisheries waters) to only take place during July-September in any year and completed before 30 September in any year.	Mitigation measures for Aquatic Ecology are outlined in Section 8.8.3.
	Movement/transfer of INNS to any other water body and any other River Basin must be prevented.	Mitigation measures for Aquatic Ecology are outlined in Section 8.8.3.
	Grand Canal crossing by directional drilling should be considered.	It is proposed to cross the Grand Canal by trenchless excavation.
	Least Constrained Pipeline Corridor should have flexibility in choosing suitable watercourse crossing points to minimize potential impacts on fisheries waters particularly in relation to spawning and nursery areas.	Ecological constraints were considered and avoided where practicable during the route selection process.

Consultee	Consultee Response	EIAR Response/Reference
IFI	Intake structure must include screening arrangements to prevent admission of any fish species.	It is proposed to provide three Raw Water Intake (RWI) points, each fitted with a passive wedge-wire cylinder (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 (approximately 2.0m in diameter) are limited to 0.15m/s, the velocity at which juvenile fish can swim away without being trapped against the screen.
	Micro tunnelling/directional drilling is recommended for a number of river courses to prevent disruption to aquatic habitats.	Larger FW2 water bodies and/or the FW2 water bodies ranked as being of 'high ecological value' and very likely to support important fish stocks, would be crossed by trenchless excavation utilising pipe jacking or auger bore technique.
	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.	Watercourse crossings have been shared and discussed with IFI.
	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 would require a temporary clear span bridge.	To maintain the unhindered flow of construction traffic from one part of the works to another, temporary bridges would be deployed to span watercourses. These would only be retained for the duration of the construction of the Proposed Project.
	Noise and Vibration should consider impacts on fish.	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. This information was used to assess the potential impact of each noise source on fish species in Parteen Basin (Section 8.7.3.2).
	Most of the watercourse crossing in the Barrow catchment have been subject to significant over-deepening and over-widening in the recent past and because of the extent of the hydro-morphological damage and relatively low gradient for any habitat restoration to occur here the replacement of gravels will be necessary. IFI request that the reintroduction of gravels to all watercourse crossings on the Barrow system linked to this Proposed Project be carried out as part of these works.	Reintroducing gravels to watercourses is a method of river restoration and typically involves using gravels to either raise the riverbed or create variations in depth and flow speeds, which in turn can improve water quality and habitat in the watercourse. The reintroduction of gravels would be an 'enhancement', and not essential mitigation for the Proposed Project. An enhancement is defined as a measure that is over and above what is required to mitigate the adverse effects of the Proposed Project. Unlike mitigation and compensation measures, enhancements are not factored into the determination of significance. As such, the general reintroduction of gravels is included in the EIAR as an enhancement, but not a specific measure that is relied upon in the EIAR to inform the conclusions on likely significant effects (Section 8.8.3.1). At this stage, specific locations have not been identified, as there is uncertainty regarding river conditions at the time of construction works, and there is a need for further investigations and to have further discussions with IFI on which watercourses gravels should be reintroduced to. Uisce Éireann will work with IFI leading up to the Construction Phase to identify watercourse crossings where gravels could be reintroduced and to agree the works to be undertaken.
BWI	It would 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 and migratory birds.	A mitigation strategy will be implemented during construction (which would continue to be effective for the Operational Phase) to minimise the mortality risk and the effects of habitat loss, habitat degradation (e.g. through pollution or deterioration of habitats), and disturbance to breeding and/migratory birds.
	Ensure that there is an assessment of impacts to Red and Amber Listed BoCCI, in particular breeding curlew. This is important to comply with Article 4(4) of the Birds Directive.	Potential impacts on Red and Amber Listed BoCCI, including curlew, are considered in Section 507 to Section 8.7.

Consultee	Consultee Response	EIAR Response/Reference
BWI	The need to assess the potential for impacts relating to soil compaction and drainage resulting from construction activities. Such activities could negatively affect breeding waders.	The machines used for the reinstatement of topsoil and subsoil would be of a suitable ground bearing pressure to minimise compaction as much as is practicable. The construction methodology would ensure that the drainage pattern of either the surface water or groundwater is not altered because of the pipelines. This would be achieved by using the native excavated material as backfill and avoiding the use of imported granular bedding or surround materials where practicable. It would also be achieved using clay 'stanks', which are sections of backfill across the trench in a low permeability material, to prevent unintended longitudinal drainage along the trench.
	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.	Site clearance involving the trimming or clearing of vegetation (including treelines and hedgerows) shall take place outside of the breeding bird season.
Irish Hen Harrier Winter Survey	Consultee provided locations of potential and confirmed hen harrier roosts within the ZOI of the Proposed Project and VP locations used by the Irish Hen Harrier Winter Survey. Consultee noted, ' <i>it is important to realise that the harriers (and other species) can use the same or different parts of a site over time</i> '.	The information provided was used to inform the site selection for Hen Harrier Winter Roost Surveys.

135. In addition to the responses received in relation to the informal EIS Scoping Report, consultation meetings were held with NPWS in May 2014, October 2014, December 2015, August 2016, April 2019, November 2022, April 2024 and April 2025, and with IFI in December 2014, October 2015, March, April and September 2016, January 2017, September 2019, May 2024 and June 2025. During these meetings, consultees were briefed on topics including the emerging preferred option, the Proposed Project, the planning process, updates to legislation and survey effort.

136. The NPWS made the following comments/observations relevant to the EIAR and Biodiversity chapter:

- The EIAR must include a full and detailed description of all elements of the Proposed Project, including temporary works areas, compounds and depots
- The EIAR should consider key ecological receptors and should present data, information and analysis specific and relevant to the Proposed Project, including characterisation of habitats as Annex I/Annex I priority habitat types (or not as the case may be) with scientific justification and supporting evidence (such as vegetation community data) to support conclusions reached
- Consideration must be given to the potential ecological impacts associated with abstraction during drought periods and compensation flow to the Old River Shannon
- The EIAR must consider Section 22 of the Wildlife Acts and species of protected wild birds, in particular the clearance of vegetation during the bird nesting season
- The EIAR must assess potential cumulative impacts, in particular the existing impoundment at Ardnacrusa, along with the details of any mitigation measures that apply
- The EIAR must consider discharges to watercourses from the Proposed Project
- The EIAR must address likely significant effects on European sites. The EIAR may align with and cross-reference or reflect content of the NIS but may not omit, overlook or exclude consideration of the likely effects on European sites. Issues which were raised by the NPWS specifically of relevance to Appropriate Assessment are listed separately in the NIS and are not repeated here.

137. The IFI made the following comments/observations relevant to the EIAR and Biodiversity chapter:

- Bio-security protocols would be very important for the Proposed Project

- The EIAR must consider IFI's preferred engineering approaches to river and stream crossings. Set back distances where trenchless crossings are taking place should also be considered
- IFI noted that the Little Brosna River is influenced by karst hydrogeology and is an important spawning river for brown trout (*Salmo trutta*) in winter with high flows, while in summer it can go almost dry
- IFI advised that in cases where watercourses are to be temporarily diverted or piped (i.e. damming and fluming), diversion pipes would need to be adequately sized to not restrict velocities during construction work. There would also need to be consideration of how to control sediment and surface water runoff from, for example, access tracks
- The EIAR must consider chlorinated water and potential adverse impacts on watercourses and fisheries during the draindown of the pipeline
- Habitat restoration/reinstatement following in-stream works would be required, with hydromorphology improvements for fisheries undertaken, where appropriate
- Consideration must be given to the presence of zebra mussels (INNS) in Parteen Basin, potential fouling on intake screens, and measures to avoid their spread
- The proposed intake design must consider avoiding/minimising fish or eels being taken up into the raw water pumps
- The impact of the abstraction on water levels (taking climate change scenarios into consideration) and the assimilative capacity in the River Shannon downstream of Parteen should be reviewed
- IFI advised that salmonid designated waters could not be subject to derogation application by Uisce Éireann as it is not a validated body under the Local Authorities (Works) Act 1949.

138. These observations and comments have been taken on board and implemented throughout the EIAR.

8.2.7 Appraisal Method for the Assessment of Impacts

139. The evaluation of ecological importance, the assessment of the magnitude of impacts, and the assessment of the significance of effects have been evaluated using a systematic approach based on guidance within the following guideline documents: CIEEM (2018), EPA (2022) and NRA (2009a). The appraisal method is further described hereunder.

8.2.7.1 Evaluation of Ecological Importance

140. Ecological receptors are evaluated following NRA (2009a) guidelines which set out the importance of the receptors in a geographical context. These guidelines are consistent with the approach recommended in the 'Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine' (CIEEM 2018).

141. The information gathered from desk studies and field surveys was used to evaluate the effects of the Proposed Project upon the identified ecological receptors on an importance scale ranging from international – national – county importance – local importance, high value – local importance, low value. Those features identified as being of high local importance or greater are carried forward in the ecological evaluation as KERs when considering the potential for significant effects, as outlined in the NRA guidelines (NRA 2009a). The criteria shown in Table 8.17 have been used in evaluating ecological value within the Proposed Project.

Table 8.17: Ecological Valuation Criteria at Different Geographical Scales Used in Assessing the Ecological Importance of Sites

Importance	Ecological Valuation
International importance	• 'European site' including Special Area of Conservation (SAC)⁷, Site of Community Importance, Special Protection Area (SPA), proposed Special Area of Conservation or proposed Special Protection Area • Features essential to maintaining the coherence of the Natura 2000 Network • Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive • Resident or regularly occurring populations (assessed to be important at the national level) of species of animal and plants listed in Annex II and/or IV of the Habitats Directive • Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971) • Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations 1988, (S.I. No. 293 of 1988) • Major salmon river fisheries.
National importance	• Site designated or proposed as a Natural Heritage Area (NHA) • Statutory Nature Reserve • Refuge for Fauna and Flora protected under the Wildlife Acts 1976 to 2012 • National Park • Resident or regularly occurring populations (assessed to be important at the national level) of species protected under the Wildlife Acts 1976 to 2012; and/or species listed on the relevant Red Data list • Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive • Major trout river fisheries • Commercially important coarse fisheries • Water bodies with high amenity value.
County importance	• Area of special amenity • Area of High Amenity, or equivalent, designated under a County Development Plan • Resident or regularly occurring populations (assessed to be important at the County level) of: - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive - Species protected under the Wildlife Acts 1976 to 2023 - Species listed on the relevant Red Data list • Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of international or national importance.
Local importance (higher value)	• Locally important populations of priority species or habitats or natural heritage features identified in the Local Biodiversity Action Plan, if this has been prepared • Resident or regularly occurring populations (assessed to be important at the Local level) of: - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive - Species protected under the Wildlife Acts 1976 to 2023 - Species listed on the relevant Red Data list • Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality • Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value • Sites of 'High' water quality status (Q4-5, Q5) • Water bodies with some fisheries value and potential salmonid habitat.
Local importance (lower value)	• Sites containing small areas of semi-natural habitat that are of some local importance for wildlife • Sites or features containing non-native species that are of some importance in maintaining habitat links • Water bodies with no fisheries value and poor fisheries habitat.

Note: Source of information: Adapted from NRA (2009a)

⁷ Where SAC is used it also includes candidate SAC

8.2.7.2 Assessment of Impacts

142. The criteria used for assessing the magnitude of impacts was undertaken in accordance with guidelines within EPA (2022) as is outlined in Table 8.18. Via this approach, a scientific and repeatable method was applied whereby all aspects of a potential impact were considered. The magnitude of potential impacts is defined by a series of factors including the spatial extent of any interaction, the likelihood, quality (positive or negative), duration, frequency, and reversibility of a potential impact.

Table 8.18: Criteria for Determining Magnitude of Impacts (Source: EPA 2022)

Significance of Effects	Definition
Describing the extent and context of effects	<u>Extent</u> Describe the size of the area, the number of sites and the proportion of a population affected by an effect.
	<u>Context</u> Describe whether the extent, duration or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Describing the probability of effects	<u>Likely effects</u> The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
	<u>Unlikely effects</u> The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Quality of effects	<u>Positive effects</u> A change which improves the quality of the environment (for example, by increasing species diversity, or improving the reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
	<u>Neutral effects</u> No effects, or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	<u>Negative/adverse effects</u> A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).
Duration and frequency of effects	<u>Momentary effects</u> Effects lasting from seconds to minutes.
	<u>Brief effects</u> Effects lasting less than a day.
	<u>Temporary effects</u> Effects lasting less than a year.
	<u>Short-term effects</u> Effects lasting one to seven years.
	<u>Medium-term effects</u> Effects lasting seven to fifteen years.
	<u>Long-term effects</u> Effects lasting fifteen to sixty years.
	<u>Permanent effects</u> Effects lasting over sixty years.
	<u>Reversible effects</u> Effects that can be undone, for example through remediation or restoration.
	<u>Frequency of effects</u> Once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually.

8.2.7.3 Assessment of Significance of Effects

143. Likely significant effects have been predicted based on the detail provided on the Proposed Project as set out in Chapter 4 (Proposed Project Description) and Chapter 5 (Construction & Commissioning).
144. The CIEEM (2018) guidance recommends the avoidance of a matrix approach and categorisation when assessing the significance of effects which is the approach recommended within the EPA (2022) guidelines. Therefore, reference was made instead to the methodology outlined in the NRA (2009a) and CIEEM (2018) guidelines which requires the significance of an effect to be determined by either effects on integrity of the ecological feature or conservation status, regardless of the geographical level at which these would be relevant. The definitions of integrity and conservation status are provided as follows.
145. The term integrity should be regarded as the '*coherence of ecological structure and function, across the entirety of a site, that enables it to sustain all of the ecological resources for which it has been valued. Impacts resulting in adverse changes to those ecological structures and functions would be considered to be significant*' (NRA 2009a). An impact on the integrity of biodiversity is considered to be significant if it moves the condition of the ecosystem away from a favourable condition: removing or changing the processes that support the sites' habitats and/or species; affect the nature, extent, structure and functioning of component habitats; and/or, affect the population size and viability of component species.
146. The definitions for conservation status given in the EU Habitats Directive 92/43/EEC, in relation to habitats and species, are also used in the CIEEM (2018) and NRA (2009a) guidance:
- For natural habitats, conservation status means the sum of the influences acting on the natural habitat and its typical species, that may affect its long-term distribution, structure and functions, as well as the long-term survival of its typical species, at the appropriate geographic scale
 - For species, conservation status means the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its populations, at the appropriate geographic scale.
147. An impact on the conservation status of a habitat or species is considered to be significant if it would result in a change in conservation status.
148. After the definitions provided in the EU Habitats Directive 92/43/EEC, the conservation status of a habitat is favourable when:
- Its natural range and areas 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 as defined below under species.
149. The conservation status of a species is favourable 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 will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.
150. In summary, as per the NRA (2009a) and CIEEM (2018) guidelines, if it is determined that the integrity and/or conservation status of an ecological feature will be impacted on, then the level of significance of that impact is related to the geographic scale at which the impact would occur (i.e. local, county, national, international). In some cases, an impact may not be significant at the geographic scale at which the

ecological feature has been valued but may be significant at a lower geographic level. For example, a particular impact may not be considered likely to have a negative effect on the overall conservation status of a species which is considered to be internationally important. However, an impact may occur at a local level on this internationally important species. In this case, the impact on an internationally important species is considered to be significant only at a local, rather than international level.

8.2.7.4 Evaluation Criteria – Breeding and Wintering Birds

8.2.7.4.1 Evaluating Sensitivity (Ornithology)

151. A separate, more relevant evaluation criteria procedure from the NRA (2009a) guidelines is used for breeding and wintering birds. It is based on sensitivity of populations and magnitude of possible impacts. This approach follows standard assessment criteria based on Percival (2003) and has been adapted to include a 'very low' sensitivity (Table 8.19). The sensitivity of a species is defined by Percival (2003) as '*its ecological importance and nature conservation interest at the site being assessed*'. A number of factors are used to determine this sensitivity:

- Whether the species is on Annex I of the Birds Directive
- Whether the species is particularly ecologically sensitive: this includes larger birds of prey and rare breeding birds (including divers, common scoter (*Melanitta nigra*), hen harrier, lapwing (*Vanellus vanellus*), woodcock and curlew)
- Whether the site contains species at internationally important numbers (where a site regularly supports >1% of the 'flyway' population, i.e. a route between breeding and wintering areas taken by concentrations of migrating birds) or nationally important numbers (>1% of Irish population)
- Whether the site contains species at regionally important numbers (>1% of regional population, with the region usually taken as the county)
- Whether the species is subject to special conservation measures, e.g. as Red, Amber or Green species on BWI's list of Birds of Conservation Concern (Gilbert *et al.* 2021).

152. The sensitivity is further affected by any nature conservation designations in the area. The determination of sensitivity needs to take into account whether a species contributes to the overall objectives of the designation (including whether the species is notified as a qualifying feature of the site), and specifically for internationally important SPAs, it needs to consider whether the species contributes to the overall integrity of the site (Percival 2003). The determination of sensitivity is summarised in Table 8.19.

Table 8.19: Determination of Sensitivity (Ornithology)

Sensitivity	Determining Factor
Very High	• Species that form the cited interest of SPAs and other statutorily protected nature conservation areas. Cited means mentioned in the citation text for the site as a species for which the site is designated.
High	• Species that contribute to the conservation objectives of an SPA (and/or SAC) but which are not cited as species for which the site is designated • Ecologically sensitive species including the following: divers, common scoter, hen harrier, golden eagle, red-necked phalarope (<i>Phalaropus lobatus</i>), roseate tern (<i>Sterna dougalli</i>) and chough (<i>Pyrrhocorax pyrrhocorax</i>) • Species present in nationally important numbers (>1% Irish population).
Medium	• Species on Annex I of the EC Birds Directive • Species present in regionally important numbers (>1% regional (county) population) • Other species on BirdWatch Ireland's Red List of Birds of Conservation Concern.
Low	• Any other species of conservation interest, including species on BirdWatch Ireland's Amber List of Birds of Conservation Concern not covered above.
Very Low	• Receptors with no apparent connectivity with designated populations or important population concentrations • Other species on BirdWatch Ireland's Green List of Birds of Conservation Concern.

Note: Source of information: Percival (2003)

8.2.7.4.2 Determining the Magnitude of the Possible Impact (Ornithology)

153. Once the species/population(s) in the study area were evaluated in terms of their sensitivity, the magnitude of possible impacts on ornithological receptors was determined following the methods outlined by Percival (2003). The descriptions of the magnitude of possible impacts are provided in Table 8.20.

Table 8.20: Determination of Magnitude of Impact (Ornithology)

Magnitude	Description
Very High	- Total loss or very major alteration to key elements/features of the baseline conditions such that the post development character/composition/attributes would be fundamentally changed and may be lost from the site altogether - Guide: < 20% of population/habitat remains.
High	- Major loss or major alteration to key elements/features of the baseline (pre-development) conditions such that post development character/composition/attributes would be fundamentally changed - Guide: 20-80% of population/habitat lost.
Medium	- Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition/attributes of baseline would be partially changed - Guide: 5-20% of population/habitat lost.
Low	- Minor shift away from baseline conditions. Change arising from the loss/alteration would be discernible but underlying character/composition/attributes of baseline condition would be similar to pre-development circumstances/patterns - Guide: 1-5% of population/habitat lost.
Negligible	- Very slight change from baseline condition. Change barely distinguishable, approximating to the 'no change' situation - Guide: < 1% population/habitat lost.

Note: Source of information: Percival (2003)

8.2.7.4.3 Assessment of the Effect Significance (Ornithology)

154. To assess the significance of the potential effect, the relationship between sensitivity and magnitude must be understood. This is achieved by cross-tabulating magnitude with the sensitivity to provide a prediction of the significance of each effect on bird species (Table 8.21). This matrix has been adapted from Percival (2003) to correspond with the definitions for significance of effects in accordance with EPA (2022).

Table 8.21: Significance Matrix (Ornithology): Combining Magnitude and Sensitivity to Assess Significance

Significance		Sensitivity				
		Very High	High	Medium	Low	Very Low
Magnitude	Very High	Profound	Very Significant	Significant	Moderate	Slight
	High	Very Significant	Significant	Significant	Slight	Not Significant
	Medium	Significant	Significant	Moderate	Slight	Imperceptible
	Low	Moderate	Slight	Slight	Not Significant	Imperceptible
	Negligible	Slight	Not Significant	Imperceptible	Imperceptible	Imperceptible

Note: Source of information: Percival (2003) and EPA (2022)

155. The significance of any one effect is a product of the sensitivity of the receptor, the magnitude of the impact and the probability of that impact occurring. Percival (2003) states *'the test of significance of an impact would be whether the [development] impact is causing a significant change to the population, its range or distribution'*. The population against which the extent of the effect is felt should be quantified. Percival (2003) defines this population as a local ecological unit of sufficient size. This population provides a baseline against which the possible effect can be assessed. A key point in the assessment is whether the Proposed Project would result in a reduction in the carrying capacity of the local area. The availability of alternative habitat in the wider area is also an important consideration.

8.2.8 Construction Flexibility

156. 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. The elements which are subject to construction flexibility are summarised in Table 8.22 and this also explains how this flexibility has been accounted for within the assessment reported in this chapter. Chapter 4 (Proposed Project Description) and Chapter 5 (Construction and Commissioning) in Volume 2 of this EIAR provides further detail.
157. The construction works necessary to deliver the permanent design (including the construction flexibility defined in Table 8.22) 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.
158. The assessment assumes habitat loss within the Proposed Project (i.e. all habitat present within the Planning Application Boundary would be temporarily or permanently lost during the Construction Phase). While mitigation measures to reduce habitat loss and fragmentation are included, such as the replanting of habitat which would be lost, where feasible (Section 8.8.2), restrictions would be in place regarding the planting of trees within the 20m wide Permanent Wayleave due to the impact of the root systems on the underlying pipeline. Such restrictions would result in a permanent loss of existing mature treelines and/or woodland habitat within the 20m wide Permanent Wayleave.
159. The assessment reported in this chapter has taken account of this construction flexibility and assessed all the likely significant effects that could arise. For this assessment, the likely significant effects reported in this chapter would not change regardless of the alignment or location of infrastructure elements within the defined construction flexibility in Table 8.22 (i.e. the difference in effects would be imperceptible for the purpose of the assessment).

Table 8.22: Definition of Construction Flexibility

Design Element	Construction Flexibility	How this has been Applied / Assessed in this Chapter
Pipeline	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).	The assessment assumes habitat loss and disturbance within the Planning Application Boundary during construction. There would be no operational biodiversity effect in relation to the alignment of the Treated Water Pipeline and RWRMs. Therefore, the defined construction flexibility does not affect this assessment.

Design Element	Construction Flexibility	How this has been Applied / Assessed in this Chapter
Pipeline	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 and consequently have been assessed for significant environmental effects as reported in this EIAR. These include e.g. TWB 27100 - 27700 and TWC 2600 - 2750. 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 environmental effects from the vertical alignment within this defined flexibility. The likely significant effects reported in this chapter would not change regardless of the vertical alignment.
Valves	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 in the two rows 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 (but still remaining within the 20m Pipeline Corridor).	The assessment has identified the likely significant environmental effects from the valves being located within this defined construction flexibility. The likely significant effects reported in this chapter would not change regardless of the valve locations.
Outfall connections	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 environmental effects from the outfall connections being within the 10m corridor. The likely significant effects reported in this chapter would not change regardless of the outfall connection locations.
Outfall 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 environmental effects from the outfalls being located within the 20m flexibility. The likely significant effects reported in this chapter would not change regardless of the outfall locations.

8.2.8.1 Variation in Construction Methods

160. In addition to the construction flexibility defined in Table 8.22, there may also be the potential for variation in the method of construction to be used to build the Proposed Project. This variation would be necessary to deal with, for example, uncertainties in ground conditions or on-site constraints. Chapter 5 (Construction & Commissioning) includes further detail on these, including the reasoning why different techniques may be required. This could include:

- Use of raft foundations or concrete piled foundations at the WTP
- Use of auger bore or pipe jacking for trenchless crossings
- Using trenchless crossing or open excavation for the crossing of low voltage power lines
- Different construction techniques for working in poor ground include peat materials.

161. The assessment reported in this chapter has been based on any of these construction techniques being adopted.

162. As set out in Appendix A5.3 (Methods of Working in Peat), four slightly different methods for constructing the pipeline in areas of peat soils have been defined. To allow for variation in ground conditions it has been assumed for the purpose of the assessment reported in this EIAR that either Method 2, 3 or 4 could be used in areas where the depth of peat is greater than 1m. Where the depth of peat is less than 1m, Method 1 is proposed to be used and it is not expected that there would be any deviation from this methodology. The environmental effects from Methods 2, 3, and 4 would be similar. However, Methods 3 and 4 would result in additional permanent infrastructure in the form of stone pillars (Method 3) or piled supports (Method 4) below the pipeline. Consequently, Method 4 would require piling and as such, would have a slighter greater environmental impact. Therefore, the EIAR is based on the application of Method 4 where the depth of peat is greater than 1m. However, in areas where Methods 2, 3, or 4 could be used, the environmental assessment has considered whether these different methods would result in different likely significant effects and therefore the assessment reported in this chapter has identified the likely significant effects from any of the three techniques.
163. On a precautionary basis, the study area for protected fauna was extended to 150m for areas of Method 4 (as identified on Figure 5.35 to Figure 5.85). This is in line with NRA guidance (NRA 2006d; NRA 2008a) and is on the basis that driven sheet piles is most likely to occur at these locations. The contractor will only use Method 4 where it proves to be necessary. The flexibility in the construction method in peat is needed to allow the contractor to choose the method best suited to the on-site conditions for sections of deeper peat (deeper than 1m). The contractor will not in practice adopt Method 4 for the whole of the length on the pipeline currently identified as being either Method 2, 3 or 4 in Figure 5.35 to 5.85. Therefore, extending the study area from 75m to 150m along the whole of the 22.4km as being either Method 2, 3 or 4 would be a disproportionate response to this uncertainty. Rather, the study area was extended where the peat has been identified as deep (i.e. areas identified on Figure 5.35 to Figure 5.85) and therefore, it is most likely that Method 4 would be adopted. In addition, the study area was extended to 150m at watercourse crossings and to follow areas where suitable habitat existed for protected mammals, depending on land access permission. In the event that Method 4 is used by the Contractor in areas identified as Method 2 or 3, pre-construction surveys will be undertaken within the extended 150m study area, and in the event that badger setts or otter holts are identified, the mitigation measures set out in Section 8.8.2 will be implemented. This would mean that disturbance impacts would be minimised or avoided such that there would be no likely significant effects on protected fauna.
164. Therefore, the difference in effect generated between the different methods would not be substantial as appropriate mitigation will be implemented to avoid significant effects (differences between the methods would be imperceptible for the purpose of the assessment), and therefore the likely significant effects reported in this chapter would not change regardless of the working in peat method used.

8.2.9 Difficulties Encountered in Compiling Information

165. The main difficulty encountered compiling information during the preparation of this chapter of the EIAR was restricted land access or inaccessible areas to undertake baseline surveys.
166. '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, 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.

167. 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 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.
168. 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.
169. Notwithstanding the difficulty with regard to '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 effect 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.
170. Over the years a number of surveys had to be cancelled or did not proceed for various reasons such as the COVID-19 pandemic, project programme, and unsuitable weather conditions. However, this is not considered to be a limitation as surveys were rescheduled for subsequent days/months/years.
171. 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.
172. 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 the macroinvertebrate 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 the inability to fully survey these areas.

173. In August 2020, during a specific lepidoptera (butterflies and moths) survey at the WTP site, the actinic light-trap failed to operate. It is not known why this failure occurred; no fault was found, and the trap had been functioning satisfactorily up to this date. As a result, only a few species were recorded by day at this site. Notwithstanding this difficulty, inferences could be made on the suitability of the site for protected lepidoptera species based on the suitability of the habitats present. In addition, incidental observations were recorded during other surveys undertaken at the site. No suitable habitat for protected lepidoptera species was recorded. The biodiversity value of the site is of local importance (lower value). Thus, repeat surveys were not required due to the lack of potential for protected lepidoptera species. Therefore, it is considered that sufficient data were gathered to reliably inform the impact assessment.
174. The information that has informed the assessment is sufficient to identify the likely significant effects. The limitations described in this chapter are not considered to have a material impact on the assessment conclusions because of the reasons stated above.

8.2.10 Cumulative Effects Assessment

175. As noted in Chapter 2 (The Environmental Impact Assessment Process), intra-project cumulative effects are described within respective topic chapters, while inter-project cumulative effects are described in Chapter 21 (Cumulative Effects & Interactions). The EIA Directive includes the consideration of existing projects within the cumulative effects assessment, and this is addressed through a consideration of the incremental impact of the Proposed Project within the context of the existing baseline as described, and where applicable, the carrying capacity of the environment.
176. Biodiversity KERs can be impacted from multiple sources. Intra-project effects of note in relation to biodiversity include the assessment of dewatering impacts on GWDTes, the effect of water quality and hydrological impacts on aquatic ecology, disturbance effects from noise impacts, and the effect on habitat degradation from air quality impacts, including dust emissions and nitrogen and ammonia deposition. Consideration of these intra-project effects is an integral part of assessing the effect on biodiversity. The assessment of effects on biodiversity has therefore been informed by relevant information collated by other environmental topics, notably Chapter 6 (Noise & Vibration), Chapter 9 (Water) and the Water Status Impact Assessment Report, Chapter 10 (Soils, Geology and Hydrogeology), and Chapter 12 (Air Quality) of the EIAR. These intra-project effects for biodiversity are also summarised in Chapter 21.

8.3 Baseline Environment

177. The following section describes the receiving ecological environment and biodiversity within the Zol of the Proposed Project.
178. Section 8.3.1 discusses designated areas for nature conservation within the Zol and provides a summary of the biodiversity baseline for each European site. Section 8.3.2 to Section 8.3.5 describe the ecological baseline as it relates to information identified as part of the desktop review and the results of field surveys, under the following headings:
- Terrestrial Ecology (Section 8.3.2)
 - Aquatic Ecology (Section 8.3.3)
 - Ornithology – Breeding Birds (Section 8.3.4)
 - Ornithology – Wintering Birds (Section 8.3.5).

8.3.1 Designated Areas of Nature Conservation

179. Nationally and internationally designated areas of nature conservation considered relevant to the Proposed Project are considered herein.

8.3.1.1 European Sites

180. SACs are designated under the Habitats Directive (92/43/EEC) as amended, which is transposed into Irish law through a variety of legislation including the Birds and Habitats Regulations and the Planning Acts, for the protection of habitats listed on Annex I and/or species listed on Annex II of the Directive.
181. Special Protection Areas are designated under the Birds Directive (2009/147/EC) for the protection of protected bird species listed on Annex I of the Directive, regularly occurring populations of migratory species (such as ducks, geese or waders), and areas of international importance for migratory birds.
182. There are 78 European sites (SACs and SPAs) located within the potential Zol of the Proposed Project (i.e. European sites downstream of the Proposed Project, within the same GWB as the Proposed Project, or having another potential pathway for other types of effects; Figure 8.1; see Table 6.2 of the NIS). Of these, 19 are considered to have a source-pathway-receptor to the Proposed Project (i.e. within the Zol). 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 8.23 outlines the qualifying interests and special conservation interest species for the 19 European sites within the Zol. All other European sites are located beyond the Zol and therefore there is no potential for them to be impacted by the Proposed Project. It should be noted, the Grand Canal and the Liffey¹⁴⁰, which would be crossed by trenchless excavation, are upstream of the South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, North Dublin Bay SAC and North Bull Island SPA. However, no viable pathway was found between these sites and the Proposed Project, and they were therefore screened out from further assessment (see Section 6.2 of the Appropriate Assessment Screening Report).

Table 8.23: European Sites Within the Zone of Influence of the Proposed Project and With a Source-Pathway-Receptor Link to the Proposed Project

European Site	Qualifying Interest(s)/Special Conservation Interest Species	Distance from Proposed Project and Potential Impacts
Lower River Shannon SAC [002165]	- 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] <i>Salicornia</i> and other annuals colonising mud and sand [1310] - Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] - Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] - Water courses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260] <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410] - Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>)* [91E0] <i>Margaritifera margaritifera</i> (freshwater pearl mussel) [1029] <i>Petromyzon marinus</i> (sea lamprey) [1095] <i>Lampetra planeri</i> (brook lamprey) [1096] <i>Lampetra fluviatilis</i> (river lamprey) [1099] <i>Salmo salar</i> (salmon) [1106] <i>Tursiops truncatus</i> (common bottlenose dolphin) [1349] <i>Lutra lutra</i> (otter) [1355]	The proposed RWI&PS and 38 kV Uprate Works are located within the boundaries of this SAC. Potential for direct, indirect, and cumulative impacts (habitat loss and fragmentation, habitat degradation, disturbance/displacement and mortality risks) on qualifying interests and supporting habitats exist.
Lisduff Fen SAC [002147]	- Petrifying springs with tufa formation (Cratoneurion)* [7220] - Alkaline fens [7230] <i>Vertigo geyeri</i> (Geyer's whorl snail) [1013]	This SAC is located 490m 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 impacts.
Sharavogue Bog SAC [000585]	- 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 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 impacts.
River Barrow and River Nore SAC [002162]	- 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 (<i>Glauco-Puccinellietalia maritima</i>) [1330] - Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] - Water courses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> 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 <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>)* [91E0] <i>Vertigo moulinsiana</i> (Desmoulin's whorl snail) [1016] <i>Margaritifera margaritifera</i> (freshwater pearl mussel) [1029] <i>Austropotamobius pallipes</i> (white-clawed crayfish) [1092] <i>Petromyzon marinus</i> (sea lamprey) [1095] <i>Lampetra planeri</i> (brook lamprey) [1096] <i>Lampetra fluviatilis</i> (river lamprey) [1099] <i>Alosa fallax</i> (twait shad) [1103] <i>Salmo salar</i> (salmon) [1106] <i>Lutra lutra</i> (otter) [1355] <i>Trichomanes speciosum</i> (Killarney fern) [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 impacts and/or the spread of INNS.
Lough Derg, North-East Shore SAC [002241]	<i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130] - Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae* [7210] - Alkaline fens [7230] - Limestone pavements* [8240] - Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>)* [91E0] <i>Taxus baccata</i> 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: Ardcroney Stream, Sheshheraghmore Stream, and Ballyfinboy River. Surface water and groundwater pathways exist. It is also located within the hydrological Zol 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 impacts.
Rye Water Valley/Carton SAC [001398]	- Petrifying springs with tufa formation (Cratoneurion)* [7220] <i>Vertigo angustior</i> (narrow-mouthed whorl snail) [1014] <i>Vertigo moulinsiana</i> (Desmoulin's whorl snail) [1016]	This SAC is located 4.5km 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 impacts.
Charleville Wood SAC [000571]	- Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>)* [91E0] <i>Vertigo moulinsiana</i> (Desmoulin's whorl snail) [1016]	This SAC is located 5.1km 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 impacts.
River Boyne and River Blackwater SAC [002299]	- Alkaline fens [7230] - Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>)* [91E0] <i>Lampetra fluviatilis</i> (river lamprey) [1099] <i>Salmo salar</i> (salmon) [1106] <i>Lutra lutra</i> (otter) [1355]	This SAC is located 13.1km 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 impacts and/or the spread of INNS.

European Site	Qualifying Interest(s)/Special Conservation Interest Species	Distance from Proposed Project and Potential Impacts
River Shannon Callows SAC [000216]	• <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410] • Lowland hay meadows (<i>Alopecurus pratensis</i>, <i>Sanguisorba officinalis</i>) [6510] • Alkaline fens [7230] • Limestone pavements* [8240] • Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>)* [91E0] • <i>Lutra lutra</i> (otter) [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, Kilgolan Lower Stream, Silver River, Gortacur Stream and House Derries Stream. Surface water and groundwater pathways exist. It is also located within the hydrological Zol 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 impacts.
Slievefelim to Silvermines Mountains SPA [004165]	• Hen harrier (<i>Circus cyaneus</i>) [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.
Slieve Bloom Mountains SPA [004160]	• Hen harrier (<i>Circus cyaneus</i>) [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.
Lough Derg (Shannon) SPA [004058]	• Cormorant (<i>Phalacrocorax carbo</i>) [A017] (Breeding & Wintering) • Tufted duck (<i>Aythya fuligula</i>) [A061] (Wintering) • Goldeneye (<i>Bucephala clangula</i>) [A067] (Wintering) • Common tern (<i>Sterna hirundo</i>) [A193] (Breeding) • Wetland and waterbirds [A999]	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. This SPA is downstream of the following watercourses crossed by the pipeline: Ardgregane Stream, Fathen Stream, Monsea Stream, Nenagh River and Upper Ballyanny Stream. Surface water and groundwater pathways also exist. It is also located within the hydrological Zol 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 impacts.
Dovegrove Callows SPA [004137]	• Greenland white-fronted goose (<i>Anser albifrons flavirostris</i>) [A395]	This SPA is located 7km north-west 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 impacts.
River Little Brosna Callows SPA [004086]	• Whooper swan (<i>Cygnus cygnus</i>) [A038] • Wigeon (<i>Anas penelope</i>) [A050] • Teal (<i>Anas crecca</i>) [A052] • Pintail (<i>Anas acuta</i>) [A054] • Shoveler (<i>Anas clypeata</i>) [A056] • Golden plover (<i>Pluvialis apricaria</i>) [A140] • Lapwing (<i>Vanellus vanellus</i>) [A142] • Black-tailed godwit (<i>Limosa limosa</i>) [A156] • Black-headed gull (<i>Chroicocephalus ridibundus</i>) [A179] • Greenland white-fronted goose (<i>Anser albifrons flavirostris</i>) [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 <i>et al.</i> 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 <i>et al.</i> 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 displacement.
River Shannon and River Fergus Estuaries SPA [004077]	• Black-headed gull (<i>Chroicocephalus ridibundus</i>) [A179] • Grey Plover (<i>Pluvialis squatarola</i>) [A141] • Whooper swan (<i>Cygnus cygnus</i>) [A038] • Golden plover (<i>Pluvialis apricaria</i>) [A140] • Shelduck (<i>Tadorna tadorna</i>) [A048] • Bar-tailed godwit (<i>Limosa lapponica</i>) [A157] • Light-bellied brent goose (<i>Branta bernicla hrota</i>) [A046] • Ringed plover (<i>Charadrius hiaticula</i>) [A137] • Black-tailed godwit (<i>Limosa limosa</i>) [A156] • Curlew (<i>Numenius arquata</i>) [A160] • Greenshank (<i>Tringa nebularia</i>) [A164] • Wigeon (<i>Anas penelope</i>) [A050] • Redshank (<i>Tringa totanus</i>) [A162] • Lapwing (<i>Vanellus vanellus</i>) [A142] • Cormorant (<i>Phalacrocorax carbo</i>) [A017] • Shoveler (<i>Anas clypeata</i>) [A056] • Teal (<i>Anas crecca</i>) [A052] • Knot (<i>Calidris canutus</i>) [A143] • Scaup (<i>Aythya marila</i>) [A062] • Pintail (<i>Anas acuta</i>) [A054] • Dunlin (<i>Calidris alpina</i>) [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 2012) 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.
Slieve Aughty Mountains SPA [004168]	• Hen harrier (<i>Circus cyaneus</i>) [A082] • Merlin (<i>Falco columbarius</i>) [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.
River Boyne and River Blackwater SPA [004232]	• Kingfisher (<i>Alcedo atthis</i>) [A229]	This SPA is located 13.1km 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 impacts.

European Site	Qualifying Interest(s)/Special Conservation Interest Species	Distance from Proposed Project and Potential Impacts
Poulaphouca Reservoir SPA [004063]	• Greylag goose (<i>Anser anser</i>) [A043] • Lesser black-backed gull (<i>Larus fuscus</i>) [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 <i>et al.</i> 2010). These species use 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.
Middle Shannon Callows SPA [004096]	• Whooper swan (<i>Cygnus cygnus</i>) [A038] (Wintering) • Wigeon (<i>Anas penelope</i>) [A050] (Wintering) • Corncrake (<i>Crex crex</i>) [A122] (Breeding) • Golden plover (<i>Pluvialis apricaria</i>) [A140] (Wintering) • Lapwing (<i>Vanellus vanellus</i>) [A142] (Wintering and Breeding) • Black-tailed godwit (<i>Limosa limosa</i>) [A156] (Wintering and Breeding) • Black-headed gull (<i>Chroicocephalus ridibundus</i>) [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, Kilgolan Lower Stream, Silver River, Gortacur Stream and House Derries Stream. Surface water pathways exist. It is also located within the hydrological Zol 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 impacts.

Note: * Priority habitats, which are in danger of disappearing within the EU territory, are highlighted with an asterisk.

183. The Proposed Project has, where feasible, avoided European sites, and as a result it crosses only one, namely the Lower River Shannon SAC. The RWI&PS is situated at Parteen Basin in the townland of Garrynatineel, County Tipperary and is partially located within the Lower River Shannon SAC (Figure 8.1). The proposed 38 kV Uprate Works crosses the Lower River Shannon SAC on one occasion. Approximately 567m of the existing 38 kV line (polesets 67B to 69B) is contained within the SAC. In relation to the proximity of 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.

8.3.1.1.1 Lower River Shannon SAC

184. The Lower River Shannon SAC extends for 120km along the Shannon Valley from Killaloe to Loop Head, County Clare. This SAC is designated for 21 habitats and/or species listed on Annex I or II of the Habitats Directive, including: alluvial forests [91E0], floating river vegetation [3260], Sea, Brook and River Lamprey [1095, 1096, and 1099 respectively], Atlantic Salmon [1106], and Otter [1355]. Many of the qualifying interest habitats of the Lower River Shannon SAC are marine/coastal in origin and do not occur within Parteen Basin.
185. Freshwater rivers have been included in the SAC, 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. The River Shannon is broad, generally slow flowing and naturally eutrophic. Semi-natural habitats, such as wet grassland, wet woodland and marsh occur by the rivers of this SAC, but improved agricultural grassland is the most common habitat type. One grassland type of particular conservation significance, *Molinia* meadows, occurs in several parts of the Lower River Shannon SAC with examples at Worldsend on the River Shannon, especially noteworthy. Alluvial woodland occurs on the banks of the Shannon and on islands in the vicinity of the University of Limerick. The woodland is up to 50m wide on the banks and somewhat wider on the largest island (Department of Arts, Heritage and the Gaeltacht (DAHG) 2013a). Neither of these Annex I habitats were recorded within the footprint of the proposed RWI&PS and therefore would not be directly impacted by the Proposed Project (for further detail refer to Section 7.1 of the NIS).
186. Parteen Basin is designated as a heavily modified water body (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, acting as an artificial reservoir for power production at Ardnacrusha Generating Station (WFD Ireland 2010; EPA 2018). Despite this, Parteen Basin has been assigned an ecological status of Good in the 2019 to 2024 ecological classification of Irish lakes for the WFD (EPA 2025). 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 WFD), i.e. deep (>4m), greater than 50ha and high alkalinity (>100mg/L CaCO₃) (Kelly *et al.* 2017b).
187. Killaloe village is located north of the inflow to Parteen Basin, with Parteen Weir delineating the southern extent of the basin. Water levels within the basin are controlled by the weirs at its outflow, diverting water down the Old River Shannon or to the Headrace for the Ardnacrusha Generating Station. Retaining embankments associated with the impoundment are on both the eastern and western edges of the basin, with the eastern basin embankment encompassing a larger area of the water body 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 weir.

188. 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 waterbodies 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 its characteristics. A comparative analysis of the conformity of Parteen Basin to the Annex I habitat show 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 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 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.
189. 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 basin. The lake bed 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 in 2017 and 2019. 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 *Fontinalis antipyretica*, considered a characteristic species of 'Water courses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-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. Although it is considered a characteristic species of 'Water courses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-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 much more variation in level than a natural lake. In water from 1.0 to 1.5m in depth, 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, also known as Nuttall's pondweed (*Elodea nuttallii*). Cobbles still retained some krustenstein cover. In water from 1.5m to 2.5m in depth, both bulrush and arrowhead formed dense stands with occasional clumps of yellow waterlily. The bulrush formed emergent reedbeds 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 lake bed. No macrophytes were recorded below 3.5m (euphotic depth) (Appendix A8.17: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2017), Appendix A8.18: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2019), and Appendix A8.23: Aquatic Invasive Species and Macrophyte Survey at Lough Derg and Parteen Basin).
190. The terrestrial footprint of the RWI&PS was surveyed by Dr. Peter Foss (wetland specialist with Wetland Survey Ireland) in June 2016 (Appendix A8.1: Parteen Habitat Assessment) and by Dr. John Cross (woodland specialist, former NPWS Project Officer) in October 2016 (Appendix A8.2: 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 being the principal species. The woodland at the proposed RWI&PS might be expected to fall into the Habitats Directive type 'Riparian forests of ash and alder of temperate and Boreal Europe lowland and hill watercourses'; however, given the vegetation type recorded and the fact the water levels in the reservoir are controlled and the site does not appear to flood, the site is not alluvial woodland but is mixed deciduous conifer woodland (as noted above) that is gradually reverting to ash-hazel woodland (further detail is provided in Section 4.3.1 of the NIS).

191. A range of botanical surveys were also undertaken at the RWI&PS site in 2020 by suitably qualified and experienced specialists. The results from these surveys are summarised as follows:

- The western part of the site comprises mixed broadleaved conifer woodland (WD2), while the eastern section is covered by mature conifer plantation (WD4). Regular shallow drains run through the area of conifer plantation and 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 (*Salix cinerea subsp. oleifolia*), 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 (*Polystichum setiferum*). Other species present included herb robert (*Geranium robertianum*), ash saplings, false-brome (*Brachypodium sylvaticum*), bramble (*Rubus fruticosus* agg.), common tamarisk-moss, and yellow pimpernel (*Lysimachia nemorum*) (Appendix A8.4: Target Habitat Surveys Report)
- In an assessment of macrofungal diversity, fifty-eight macrofungal species were recorded (Appendix A8.6: Fungi Survey Report). Twenty-three species were mycorrhizal species on tree hosts, principally oak, hazel and Sitka spruce; eighteen were saprobes (decomposers) of wood and/or leaf litter; sixteen were saprobes found on soil; and one species was a ubiquitous tree pathogen (*Armillaria mellea*, Honey or Bootlace Fungus). The list of macrofungi encountered was fairly representative of a mixed woodland habitat containing a mixture of mycorrhizal host trees on reasonably fertile soil. The macrofungal diversity is possibly enriched by the presence of old, long established mixed woodland bordering the north of the site
- The lichen flora is best described as a poor assemblage of common species, mostly crustose. In total, 34 lichen species were recorded (Appendix A8.7: Lichen Survey Report). The conservation value for all recorded species was 'Least Concern'
- A total of 69 bryophytes were recorded at the RWI&PS site; 50 mosses and 19 liverworts (Appendix A8.8: Bryophyte Survey Report). This is a moderate species diversity for a small lowland site in the west of the country. The majority of the species recorded were from the area of broadleaved woodland and the area of conifer plantation had limited species diversity and bryophyte abundance. There were no species that were new to the county and no rare/protected species recorded during the survey.

8.3.1.2 Natural Heritage Areas and Proposed Natural Heritage Areas

192. Natural Heritage Areas are legally protected from damage from the date on which they are formally proposed for designation under the Wildlife (Amendment) Act, 2000 and pNHAs have not been statutorily proposed or designated but do have some protection under County Development Plans and Licensing Authorities and for the purposes of this EIAR have been given the same level of protection as NHAs.

193. In total, there are 24 NHAs and 102 pNHAs within 15km of the Proposed Project (Table 8.24; Figure 8.2), many of which overlap with a European site and are therefore considered under European sites (Section 8.3.1.1). A 15km buffer was used as an initial screening exercise; sites within and beyond this 15km buffer were subsequently reviewed for source-pathway-receptor links. None lie within the footprint of the Proposed Project with the exception of the Grand Canal pNHA (Site Code: 002104). The Proposed Project crosses the Grand Canal pNHA on three occasions, twice at Kilpatrick, County Kildare (note, one of the two (WBX109) is for access only and would not require any works) and at Colganstown, County Dublin (Figure 8.2). The Grand Canal overlaps with Ballynafagh Lake SAC and River Barrow and River Nore SAC upstream of where the canal crosses the Proposed Project.
194. The Grand Canal is a man-made waterway linking the River Liffey at Dublin with the Shannon at Shannon Harbour and the Barrow at Athy. The Grand Canal pNHA comprises the canal channel and the banks on either side of it. The canal system is made up of a number of branches – the Main Line from Dublin to the Shannon, the Barrow Line from Lowtown to Athy, the Edenderry Branch, the Naas and Corbally Branch and the Miltown Feeder.
195. The Grand Canal pNHA is rated of national importance. A number of different habitats are found within the canal boundaries – hedgerow, tall herbs, calcareous grassland, reed fringe, open water, scrub and woodland. The hedgerow, although diverse, is dominated by hawthorn. The vegetation of the towpath is usually dominated by grass species (NPWS 2009a).
196. The diversity of the water channel is particularly high in the eastern section of the Main Line – between the Summit level at Lowtown, County Kildare (near the first proposed crossing at Kilpatrick) and Inchicore, County Dublin (near the second proposed crossing at Colganstown). Arrowhead and watercress (*Nasturtium officinale*) are more common in this stretch than on the rest of the system. All sites for hemlock water-dropwort (*Oenanthe crocata*; a poisonous plant, often mistaken for celery and parsley) on the Grand Canal system are within this stretch (NPWS 2009a).
197. Otter spraints have been found along the towpath, particularly where the canal passes over a river or stream; for example, the Grand Canal and Abbeylough River crossing which is located approximately 900m south-east of the Grand Canal and Proposed Project crossing (the closest example of such to the Proposed Project). The smooth newt breeds in the ponds on the bank at Gollierstown in County Dublin. These ponds are located approximately 740m north of the TPR and are not likely to be affected by the Proposed Project. The rare and legally protected opposite-leaved pondweed (*Groenlandia densa*; Flora Protection Order 2022) is present at a number of sites in the eastern section of the Main Line and was recorded during aquatic surveys in August 2017 at the proposed crossing near Kilpatrick, County Kildare.
198. The main channel of the Grand Canal would be crossed by trenchless excavation which would prevent the disruption to aquatic habitats. The locations for drill rig positioning and the launch and reception pits would be chosen or engineered such that the fall is away from the water body (IFI 2016), or as otherwise agreed with IFI during the Construction Phase. Using this technique, there would be no significant effects on the hydrology, water quality or geomorphology of the watercourse being crossed.
199. Of the 76 NHAs/pNHAs that do not overlap with a European site, only eleven were found to have a potential source-pathway-receptor (i.e. within the ZoI) (Table 8.24). The eleven sites are as follows:
- Screggan Bog NHA is situated approximately 7km south-west of Tullamore, mainly in the townlands of Ross and Killurin in County Offaly. The site comprises a raised bog that includes both areas of high bog and cutover bog. The Clodiagh River flows at the east of the site, and Pallas Lough bounds the site at the west, while the other margins are bounded by areas of cutover, woodland and grassland (NPWS 2002)

- Annaghmore Lough Fen pNHA is situated about 10km south of Tullamore, on the border of Laois and Offaly below the Slieve Blooms. All that remains of Annaghmore Lough itself is a small remnant pool, barely 2ha and only a couple of centimetres deep. It is not clear whether the lake shrinkage has been purely the result of the natural process of sediment accumulation, or whether this has been accelerated by drainage. However, the area once occupied by the lake, is now a peat-accumulating, calcareous fen (NPWS 2009b)
- Willsborough Esker pNHA is situated approximately 9km north of Nenagh in County Tipperary. The main habitats at this site are scrub and woodland. Although much of the esker has been improved, the remaining semi-natural habitat provides a good variety of species and habitats over such a small area. Set amongst highly farmed land this small pocket of wildlife provides an important refuge for local flora and fauna (NPWS 2009c)
- Cloonlara House pNHA is located in a three-storey domestic dwelling house and contains over 100 Leisler's bats during the summer months. Although the number of bats at this site has declined in recent years, it is still one of the biggest nursery sites in Ireland and in Europe. It is a site of international importance (NPWS 2009d)
- Birr (Domestic Dwelling No. 1, Occupied) pNHA is a nursery roost for Leisler's bat which roost along the gable end of the attic in a privately owned old dwelling house. Almost 100 bats were recorded at the house in 1987, and although the number of bats has declined since then, it is still a roost of international importance. It is possible that the bats at this site move between this and another house, known as Birr Domestic Dwelling 2, over the course of a summer (NPWS 2009e)
- Birr (Domestic Dwelling No. 2, Occupied) pNHA consists of a two-storey modern domestic dwelling which is used as a nursery site by over 200 Leisler's bats. The bats roost at the western gable end of the attic. This site is one of the biggest Leisler's bat nursery colonies in Ireland and possibly in Europe. It was first discovered in 1989 and has increased in size every year since then (NPWS 2009f)
- Kinnitty (Domestic Dwelling, Occupied) pNHA is a summer roost for Leisler's bat which roost in the fascia boards of an old domestic dwelling. The bats have been recorded at the house since 1987 and although the number of bats has never exceeded 100 animals, it is of national importance (NPWS 2009g)
- Bracken's Dwelling, Near Whiteford pNHA is a nursery roost for a Leisler's bat colony which roost in the cavity walls of a privately owned modern dwelling house near Whiteford in County Offaly. Approximately 80 bats were recorded at the house in 1992, and although fewer bats were recorded there in 1993, it is still a roost of international importance (NPWS 2009h)
- Clonad Wood pNHA is an area of deciduous woodland situated on low-lying agricultural land bordering the Clodiagh River, 5km south of Tullamore in County Offaly. The high canopy of the wood is dominated by pedunculate oak (*Quercus robur*) which has been underplanted with beech (*Fagus sylvatica*) and conifers. The understorey also contains a rich diversity of native species including holly (*Ilex aquifolium*), ash, wych elm (*Ulmus glabra*), hazel, spindle (*Euonymus europaeus*), guelder-rose (*Viburnum opulus*) and field-rose (*Rosa arvensis*) (NPWS 2009i)
- The Mount St. Joseph Woods pNHA, about 4km west of Roscrea in County Offaly, constitutes four esker woodland blocks, of which three are on the northern, and one is on the southern end of two low esker ridges that flank the Little Brosna River. Much of the pre-existing esker woodland has been felled or modified at this site, so the least altered remnant sections are of importance, especially the oak sections because such woodlands are particularly uncommon (NPWS 2009j)
- Miltown, Shinrone pNHA is located in an old stone farm building at Miltown Park, Shinrone, County Offaly. Although it has been recorded as a winter site for Natterer's bat, the only record of bats at the site was made in May 1989, which would suggest that the site is more likely to be a summer roost. The colony is estimated to number approximately 30 bats but is probably larger which would make it a nursery roost. As the national population of Natterer's Bat is estimated to be only several thousand, this nursery roost is of national importance. Natterer's Bats are dependent on woodland so any changes to existing woodland around the town could adversely affect the colony by reducing the availability of suitable foraging grounds (NPWS 2009k).

Table 8.24: Designated Natural Heritage Areas and Proposed Natural Heritage Areas Within 15km** of the Proposed Project, Features of Interest, and Source-Pathway-Receptor Determination

	Site Name	Code	Distance (km)				Overlap with European Site		Features of Interest*	Source-Pathway-Receptor
			0-1	1-5	5-10	10-15	SAC (Y/N)	SPA (Y/N)		
Natural Heritage Areas	Cangort Bog	890	✓				Y: Sharavogue Bog	—	Peatlands	Yes – downstream of the Proposed Project. Surface water and possible groundwater pathways exist.
	Screggan Bog	921		✓			N	N	Raised bog	Yes – downstream of the Proposed Project. Surface water (via Clodiagh River; flows around perimeter of bog) and possible groundwater pathways exist.
	Scohaboy Bog	937		✓			Y: Scohaboy (Sopwell) Bog	—	Peatlands	No – located within a larger raised bog system downstream in the same river sub-catchment as the Proposed Project; however, no surface water pathways exist. The site comprises a relatively large, flat 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 NHA/SAC) has been clearfelled, while areas of peat cutting have ceased since 2015. The NHA/SAC site is bounded by peatland on all margins, apart from the north where a stream (Ballyfinboy_050; SC: 25_3370) flows along the northern margin. No fen areas or GWDTEs were identified by NPWS in the NHA/SAC or in the drained margins/cutover area of the overall peatland (DAHG 2016). On this basis, no source-pathway-receptor exists, and there is no potential for direct or indirect hydrogeological impacts on Scohaboy Bog NHA as a result of the Proposed Project.
	Carbury Bog	1388		✓			N	N	Raised bog	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Hodgestown Bog	1393		✓			N	N	Raised bog	No – located upstream of the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Daingean Bog	2033		✓			N	N	Raised bog	
	Hawkswood Bog	2355		✓			N	N	Raised bog	No – located downstream in the same river sub-catchment as the Proposed Project; however, no surface water pathways exist. No groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Woodcock Hill Bog	2402		✓			N	N	Upland blanket bog and wet heath	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Black Castle Bog	570			✓		N	N	Raised bog	
	Arragh More Bog	640			✓		Y: Arragh More (Derrybreen) Bog	—	Peatlands	
	Killeen Bog	648			✓		N	N	Raised bog	No – located downstream in the same river sub-catchment as the Proposed Project; however, no surface water pathways exist. No groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Bleanbeg Bog	2450			✓		—	Y: Slievefelim to Silvermines Mountains	Peatlands	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Doon Lough	337			✓		N	N	Raised bog	
	Gortacullin Bog	2401			✓		N	N	Upland blanket bog and wet heath	No – located upstream of the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	River Little Brosna Callows	564				✓	Y: River Shannon Callows	Y: River Little Brosna Callows	Peatlands, birds	Yes – downstream of the Proposed Project. Surface water and possible groundwater pathways exist.
	Monaincha Bog/ Ballaghmore Bog	652				✓	N	N	Raised bog	No – located upstream of the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Cloncrow Bog (New Forest)	677				✓	N	N	Raised bog	No – located downstream in the same river sub-catchment as the Proposed Project; however, no surface water pathways exist. No groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Molerick Bog	1582				✓	N	N	Raised bog	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Lorrha Bog	1684				✓	N	N	Raised bog	No – located downstream in the same river sub-catchment as the Proposed Project; however, no surface water pathways exist. No groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Nore Valley Bogs	1853				✓	N	N	Raised bog	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Grageen Fen and Bog	2186				✓	—	Y: Slievefelim to Silvermines Mountains	Peatlands	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Derryoover Bog	2379				✓	—	Y: Slieve Aughty Mountains	Peatlands	
	Mauherslieve Bog	2385				✓	—	Y: Slievefelim to Silvermines Mountains	Peatlands	
	Cloonloun More Bog	2307				✓	N	N	Raised bog	
Proposed Natural Heritage Areas	Annaghmore Lough Fen (Offaly)	413	✓				N	N	Fen	Yes – downstream of the Proposed Project. Surface water and possible groundwater pathways exist.
	Lough Eorna (Ourna)	650	✓				N	N	Lake and woodland	No – located upstream of the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Derrykeel Meadows	897	✓				N	N	Wet meadows	
	Willsborough Esker	943	✓				N	N	Esker	Yes – downstream of the Proposed Project. Surface water and possible groundwater pathways exist.
	Donadea Wood	1391	✓				N	N	Demesne woodland	No – located upstream of the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.

	Site Name	Code	Distance (km)				Overlap with European Site		Features of Interest*	Source-Pathway-Receptor
			0-1	1-5	5-10	10-15	SAC (Y/N)	SPA (Y/N)		
Proposed Natural Heritage Areas	Grand Canal	2104	✓				Y: Ballynafagh Lake, River Barrow and River Nore SAC	—	Vegetated Banks	Yes – crossed by the Proposed Project.
	Lough Derg	11		✓			Y: Lough Derg, North-east Shore	Y: Lough Derg (Shannon)	Wetland and water birds, heaths, calcareous grasslands, fen, limestone pavements, woodlands	Yes – downstream of the Proposed Project. Surface water and possible groundwater pathways exist.
	Liffey Valley	128		✓			N	N	River Liffey and woodlands	No – located downstream in the same river sub-catchment as the Proposed Project; however, no surface water pathways exist. No groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Cloonlara House	28		✓			N	N	Leisler's bat	Yes – this site is designated as a summer roost for Leisler's bat and is located approximately 1.4km south of the proposed 38 kV Uprate Works. This site is beyond the Zol for any potential direct impacts on roosting bats; however, Leisler's bat frequently forage over 5km from their roost site (Kelleher and Marnell 2006) and preferentially forage over open areas such as grasslands and parklands as well as over lakes, rivers, canals and deciduous woodland edges (Carden <i>et al.</i> 2010). The CSZ for Leisler's bat is a 3km radius (Collins 2023). Therefore, there is potential for indirect effects on foraging habitats for Leisler's bat.
	Castleconnell (Domestic Dwelling, Occupied)	433		✓			Y: Lower River Shannon SAC	—	Daubenton's bat (<i>Myotis daubentonii</i>)	No – this site is designated as a nursery roost for Daubenton's bat and is located approximately 3.7km south of the proposed 38 kV Uprate Works. The CSZ for Daubenton's bat is a 2km radius (Collins 2023). Therefore, this site is beyond the Zol for any potential direct or indirect impacts to roosting, commuting or foraging Daubenton's bat.
	Birr (Domestic Dwelling No. 2, Occupied)	568		✓			N	N	Leisler's bat	Yes – these sites are designated as roosts for Leisler's bat and are located within 5km of the Proposed Project. These sites are beyond the Zol for any potential direct impacts on roosting bats; however, Leisler's bat frequently forage over 5km from their roost site (Kelleher and Marnell 2006) and preferentially forage over open areas such as grasslands and parklands as well as over lakes, rivers, canals and deciduous woodland edges (Carden <i>et al.</i> 2010). The CSZ for Leisler's bat is a 3km radius (Collins 2023). Therefore, there is potential for indirect effects on foraging habitats for Leisler's bat.
	Birr (Domestic Dwelling No.1, Occupied)	569		✓			N	N	Leisler's bat	
	Kinnitty (Domestic Dwelling, Occupied)	579		✓			N	N	Leisler's bat	
	Bracken's Dwelling, Near Whiteford	2058		✓			N	N	Leisler's bat	
	Clonad Wood	574		✓			N	N	Deciduous woodland	Yes – downstream of the Proposed Project. Surface water (via Clodiagh River; flows around perimeter of bog) and possible groundwater pathways exist.
	Sharavogue Bog	585		✓			Y: Sharavogue Bog	—	Peatlands	Yes – downstream of the Proposed Project. Surface water and possible groundwater pathways exist.
	Newchapel Turlough	653		✓			N	N	Turlough	No – located downstream in the same river sub-catchment as the Proposed Project; however, no surface water pathways exist. No groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Clonaslee Eskers and Derry Bog	859		✓			Y: Clonaslee Eskers And Derry Bog	—	Fen, whorl snail	No – upstream of the Proposed Project. No surface water pathway exists. A locally important aquifer exists in the area, upgradient of the Proposed Project, therefore there are no groundwater pathways.
	Camcor Wood	889		✓			Y: Slieve Bloom Mountains	Y: Slieve Bloom Mountains	Woodland	No – located upstream of the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Drumakeenan, Eagle Hill and Perry's Mill	900		✓			N	N	Calcareous grasslands, wet calcareous meadows	
	Kilcormac Esker	906		✓			N	N	Esker	No – located downstream in the same river sub-catchment as the Proposed Project; however, no surface water pathways exist. No groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Mount St. Joseph Woods	913		✓			N	N	Eskers and woodland blocks	Yes – downstream of the Proposed Project. Surface water (Quakerstown Stream and the Little Brosna; adjacent to Little Brosna) and possible groundwater pathways exist.
	Pallas Lough	916		✓			N	N	Lake (rich in calcium), important for wildfowl and waders	No – located downstream in the same river sub-catchment as the Proposed Project; however, no surface water pathways exist. No groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Raheen Lough	917		✓			N	N	Lake, important for wildfowl and waders	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	The Long Derries, Edenderry	925		✓			Y: The Long Derries, Edenderry	—	Semi-natural dry grasslands	No – upstream of the Proposed Project. No surface water or groundwater pathways exist as The Long Derries and Edenderry 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.
	Clareen Lough	929		✓			N	N	Wetlands	No – located downstream in the same river sub-catchment as the Proposed Project; however, no surface water pathways exist. No groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Lough Nahinch (Tipperary)	936		✓			N	N	Lake (peaty basin), important for breeding birds	No – located upstream of the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Ballynafagh Lake	1387		✓			Y: Ballynafagh Lake	—	Fen, whorl snail, marsh fritillary	No – located in a separate river sub-catchment from the Proposed Project. No surface water or groundwater pathways exist. Ballynafagh Lake is a disused reservoir influenced by the local geology and hydrogeology in the immediate area 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 Ballynafagh Lake.

	Site Name	Code	Distance (km)				Overlap with European Site		Features of Interest*	Source-Pathway-Receptor
			0-1	1-5	5-10	10-15	SAC (Y/N)	SPA (Y/N)		
Proposed Natural Heritage Areas	Rye Water Valley/Carton	1398		✓			Y: Rye Water Valley/Carton	—	Petrifying springs, whorl snail	Yes – downstream of the Proposed Project. Surface water and possible groundwater pathways exist.
	Miltown, Shinrone	2065		✓			N	N	Natterer's bat	Yes – this site is designated as a roost for Natterer's bat and is located within 5km of the Proposed Project. This site is beyond the Zol for any potential direct impacts on roosting bats; however, Natterer's bat occasionally forage up to 6km from their roost but prefer to forage broadleaved and riparian woodland habitats (Smith and Racey 2002). The CSZ for Natterer's bat is a 4km radius (Collins 2023). Therefore, there is potential for indirect effects on foraging habitats for Natterer's bat.
	Royal Canal	2103		✓			Y: Rye Water Valley/Carton	Y: River Boyne and River Blackwater SPA	Vegetated banks	Yes – downstream of the Proposed Project. Surface water and possible groundwater pathways exist.
	Glenomra Wood	1013		✓			Y: Glenomra Wood	—	Woodland	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Fergus Estuary and Inner Shannon, North Shore	2048		✓			Y: Lower River Shannon	Y: River Shannon and River Fergus Estuaries	Estuaries, mudflats, sandflats, salt meadows, water courses, wetland and water birds	Yes – downstream of the Proposed Project. Surface water and possible groundwater pathways exist.
	Knockalisheen Marsh	2001		✓			Y: Lower River Shannon	N	Wetlands	Yes – downstream of the Proposed Project. Surface water and possible groundwater pathways exist.
	Loughmore Common Turlough	438			✓		N	N	Turlough	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Inner Shannon Estuary -South Shore				✓		Y: Lower River Shannon	Y: River Shannon and River Fergus Estuaries	Estuaries, mudflats, sandflats, salt meadows, water courses, wetland and water birds	Yes – downstream of the Proposed Project. Surface water and possible groundwater pathways exist.
	Garrannon Wood	1012			✓		N	N	Woodland	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Dovegrove Callows	10			✓		—	Y: Dovegrove Callows	Wetland and water birds	Yes – located 7km north-west 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 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 site.
	Slade Of Saggart and Crooksling Glen	211			✓		N	N	Wooded river valley and a small wetland system	No – located upstream of the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Ballina Bog	390			✓		N	N	Raised bog	No – located downstream of the Proposed Project and beyond the Zol. It is partially located in the same river catchment as part of the Proposed Project; however, no surface water pathway exists. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Ballynafagh Bog	391			✓		Y: Ballynafagh Bog	—	Raised bogs, peatlands	No – located in a separate geological formation and river sub-catchment from the Proposed Project, in an elevated position, and beyond the Zol.
	Mouds Bog	395			✓		Y: Mouds Bog	—	Raised bogs, peatlands	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Slieve Bloom Mountains	412			✓		Y: Slieve Bloom Mountains	Y: Slieve Bloom Mountains	Heath, blanket bogs, woodland, raptors	Yes – located 2.5km south-east of the Proposed Project. The site is protected 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 site.
	Charleville Wood	571			✓		Y: Charleville Wood	—	Woodland, whorl snail	Yes – downstream of the Proposed Project. Surface water and possible groundwater pathways exist.
	Raheenmore Bog	582			✓		Y: Raheenmore Bog	—	Raised bogs, peatlands	No – located upstream of the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Roscrea Bog	583			✓		N	N	Fen	
	Ballyduff/Clonfinane Bog	641			✓		Y: Ballyduff/Clonfinane Bog	—	Raised bog, peatland, bog woodland	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Kilcarren-Firville Bog	647			✓		Y: Kilcarren-Firville Bog	—	Raised bog, peatland, bog woodland	
	Ballintemple Bog	882			✓		N	N	Bog with wet meadows	No – located upstream of the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Golden Grove Woods	903			✓		N	N	Beech woodland	
	Lough Coura	909			✓		N	N	Infilled lake and dry fen	No – located in the same river sub-catchment as the Proposed Project; however, no surface water pathways exist. No groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Ridge Road, SW of Rapemills	919			✓		Y: Ridge Road, SW of Rapemills	—	Semi-natural dry grasslands	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Ross and Glenns Eskers	920			✓		N	N	Esker	
	Woodville Woods	927			✓		N	N	Estate woodland and peripheral lake/wetland	
	Clare Glen	930			✓		Y: Clare Glen	Y: Slievefelim to Silvermines Mountains	Woodland	

	Site Name	Code	Distance (km)				Overlap with European Site		Features of Interest [*]	Source-Pathway-Receptor
			0-1	1-5	5-10	10-15	SAC (Y/N)	SPA (Y/N)		
Proposed Natural Heritage Areas	Derrygareen Heath	931			✓		—	Y: Slievefelim to Silvermines Mountains	Heath	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Fiagh Bog	932			✓		N	N	Calcium-rich fen and raised bog	
	Silvermine Mountains	939			✓		Y: Silvermine Mountains	Y: Slievefelim to Silvermines Mountains	Heath, semi-rich nardus grasslands, raptors	Yes – located 5.6km south-east of the Proposed Project. The site is protected 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 site.
	Spring Park Wetlands	941			✓		N	N	Wetlands	No – located upstream of the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Dodder Valley	991			✓		N	N	River Dodder and natural riverbank vegetation	
	Keeper Hill	1197			✓		Y: Keeper Hill	Y: Slievefelim to Silvermines Mountains	Heath, blanket bogs, raptors	Yes – located 5km south-east of the Proposed Project. The site is protected 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 site.
	Glenasmole Valley	1209			✓		Y: Glenasmole Valley	—	Grassland, petrifying springs	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Lugmore Glen	1212			✓		N	N	Wooded glen	No – located upstream of the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Lough Boora	1365			✓		N	N	Drained lake-bed with shallow fen peat and overlying calcareous shell-marsh	No – located in the same river sub-catchment as the Proposed Project; however, no surface water pathways exist. No groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Kilteel Wood	1394			✓		N	N	Deciduous woodland	No – located upstream of the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Liskeenan Fen	1683			✓		Y: Liskeenan Fen	—	Fen	No – located in a separate geological formation and river sub-catchment from the Proposed Project, and beyond the Zol.
	Lough Avan	1995			✓		N	N	Wetlands	No – located in the same river sub-catchment as the Proposed Project; however, no surface water pathways exist. No groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	St. Joseph's, Mountheaton	2063			✓		N	N	Brown long-eared bat	No – these sites are designated as roosts for brown long-eared bat (<i>Plecotus auritus</i>) and are located greater than 5km from the Proposed Project. Brown long-eared bats typically forage within 2km of their roost site, in woodlands, near mature trees, or along stonewalls, in search of nocturnal insects (Conserve Ireland 2018). The CSZ for brown long-eared bat is a 3km radius (Collins 2023). Therefore, these sites are beyond the Zol for any potential direct or indirect impacts to roosting, commuting or foraging brown long-eared bat.
	Drumakeenan National School	2064			✓		N	N	Brown long-eared bat	
	River Shannon Callows	216				✓	Y: River Shannon Callows	Y: Middle Shannon Callows	Grassland, limestone pavements, woodland, otter, wetland and water birds	Yes – downstream of the Proposed Project. Surface water and possible groundwater pathways exist.
	Cloonmoylan Bog	248				✓	Y: Cloonmoylan Bog	Y: Slieve Aughty Mountains	Bog, peatlands, woodland	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Curragh (Kildare)	392				✓	N	N	Open plain of lowland acid grassland	
	Pollardstown Fen	396				✓	Y: Pollardstown Fen	—	Fen, petrifying springs, whorl snail	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. A GWDTE zone of contribution is delineated to the south and south-west of the fen. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Red Bog, Kildare	397				✓	Y: Red Bog, Kildare	—	Transition mires, bog	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Rathmoylan Esker	557				✓	N	N	Esker	
	All Saints Bog and Esker	566				✓	Y: All Saints Bog and Esker	Y: All Saints Bog	Grassland, raised bogs, Greenland white-fronted goose	No – located downstream of the Proposed Project and beyond the Zol. 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.
	Banagher (Domestic Dwelling, Occupied)	567				✓	N	N	Brown long-eared bat	No – this site is designated as a roost for brown long-eared bat and is located greater than 10km from the Proposed Project. Brown long-eared bats typically forage within 2km of their roost site, in woodlands, near mature trees, or along stonewalls, in search of nocturnal insects (Conserve Ireland 2018). The CSZ for brown long-eared bat is a 3km radius (Collins 2023). Therefore, this site is beyond the Zol for any potential direct or indirect impacts to roosting, commuting or foraging brown long-eared bat.
	Clara Bog	572				✓	Y: Clara Bog	—	Grassland, raised bogs, woodland	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. 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.
	St. Anne's, (Sean Ross Abbey), Roscrea	656				✓	N	N	Leisler's bat	No – this site is designated as a roost for Leisler's bat and is located greater than 10km from the Proposed Project. Leisler's bat frequently forage over 5km from their roost site (Kelleher and Marnell 2006) and preferentially forage over open areas such as grasslands and parklands as well as over lakes, rivers, canals and deciduous woodland edges (Carden <i>et al.</i> 2010). The CSZ for Leisler's bat is a 3km radius (Collins 2023). Therefore, this site is beyond the Zol for any potential direct or indirect impacts to roosting, commuting or foraging Leisler's bat.

	Site Name	Code	Distance (km)				Overlap with European Site		Features of Interest*	Source-Pathway-Receptor
			0-1	1-5	5-10	10-15	SAC (Y/N)	SPA (Y/N)		
Proposed Natural Heritage Areas	Poulaphouca Reservoir	731				✓	—	Y: Poulaphouca Reservoir	Wetland and water birds	Yes – located 14.6km south of the Proposed Project, it is 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 <i>et al.</i> 2010). These species use 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.
	Delour River Near Lacca Manor	864				✓	Y: River Barrow and River Nore	Y: Slieve Bloom Mountains	Estuaries, mudflats, sandflats, salt meadows, water courses, heaths, flora of the montane to alpine levels, petrifying springs, woodland, whorl snail, freshwater pearl mussel, white-clawed crayfish, lamprey, twaite shad, hen harrier	Yes – downstream of the Proposed Project. Surface water and possible groundwater pathways exist.
	Ballyduff Esker	885				✓	N	N	Esker	No – located downstream in the same river sub-catchment as the Proposed Project; however, no surface water pathways exist. No groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Derrygolan Esker	896				✓	N	N	Esker	No – located in the same river sub-catchment as the Proposed Project; however, no surface water pathways exist. No groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Rahugh Ridge (Kiltober Esker)	918				✓	N	N	Esker	
	Sheehills Esker	938				✓	N	N	Esker	No – located upstream of the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Nenagh River Gorge	1133				✓	—	Y: Slievefelim to Silvermines Mountains	Unimproved semi-natural habitats	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Killavalla Wood	1178				✓	N	N	Woodland	No – located upstream of the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Liffey at Osberstown	1395				✓	N	N	Riverside vegetation	
	Glenstal Wood	1432				✓	Y: Glenstal Wood	Y: Slievefelim to Silvermines Mountains	Killarney fern	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. 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.
	Ballynabarny Fen	1573				✓	N	N	Fen	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Cloonamirran Wood	1686				✓	N	N	Raised bog which has been naturally recolonised by woodland species	No – located upstream of the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Ardan Wood	1711				✓	N	N	Natural climax forest type that the other esker vegetation is approaching	No – located in the same river sub-catchment as the Proposed Project; however, no surface water pathways exist. No groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Murphy's Bridge Esker	1775				✓	N	N	Esker	No – located downstream in the same river sub-catchment as the Proposed Project; however, no surface water pathways exist. No groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Ballyduff Wood	1777				✓	N	N	Beech woodland, abundance of spindle	No – located in the same river sub-catchment as the Proposed Project; however, no surface water pathways exist. No groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Split Hills and Long Hill Esker	1831				✓	Y: Split Hills and Long Hill Esker	—	Semi-natural dry grasslands	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Aghsmear House	2060				✓	N	N	Natterer's bat	No – this site is designated as a roost for Natterer's bat and is located greater than 10km from the Proposed Project. Natterer's bat occasionally forage up to 6km from their roost but prefer to forage broadleaved and riparian woodland habitats (Smith and Racey 2002). The CSZ for Natterer's bat is a 4km radius (Collins 2023). Therefore, this site is beyond the Zol for any potential direct or indirect impacts to roosting, commuting or foraging Natterer's bat.
	Dromsallagh Bog	1850				✓	N	N	Raised bog	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.
	Ballyvorheen Bog	1849				✓	Y: Lower River Shannon SAC	N	Raised bog	
	Rosroe Lough	2054				✓	N	N	Lake	
	Castle Lake	239				✓	N	N	Lake	
	Danes Hole, Poulnalecka	30				✓	Y: Danes Hole, Poulnalecka	N	Lesser horseshoe bat, old oak woodlands, caves	No – this site is located in a separate groundwater catchment and river sub-catchment 10km from the Proposed Project. The CSZ for lesser horseshoe bat is a 2km radius (Collins 2023). Therefore, this site is beyond the Zol for any potential direct or indirect impacts to roosting, commuting or foraging Natterer's bat or the old oak woodlands and caves.
	Lough Cullaunyheeda	1017				✓	N	N	Lake	No – located in a separate river sub-catchment from the Proposed Project and beyond the Zol. No surface water or groundwater pathway exists due to the distance, changes in geology and location upgradient of the Proposed Project.

Note:

* Source of information: pNHA and NHA site synopses archive (Available at: <https://www.npws.ie/protected-sites/nha>; Accessed: January 2025)

** A 15km buffer was used as an initial screening exercise; sites within and beyond this 15km buffer were subsequently reviewed for source-pathway-receptor links and included herein.

Cell highlighted blue indicate sites that do not overlap with a European site but have a source-pathway-receptor linkage with the Proposed Project

8.3.1.3 Ramsar Sites

200. In addition to the nationally and European designated sites listed in Table 8.23 and Table 8.24, four of the forty-five Ramsar sites (i.e. wetlands of international importance) that occur in Ireland are located within 15km of the Proposed Project (Ramsar 2022) (Figure 8.3). A 15km buffer was used as an initial screening exercise; sites within and beyond this 15km buffer were subsequently reviewed for source-pathway-receptor links. These include:

- Raheenmore Bog (Ramsar Site no. 417) – located north-east of Daingean, County Offaly, 8.5km north-east of the Proposed Project. Raheenmore Bog is also a designated SAC and pNHA
- Slieve Bloom Mountains (Ramsar Site no. 335) – located between Kinnitty and Mountrath in County Laois, approximately 8.3km south of the Proposed Project. Slieve Bloom Mountains are also a designated SAC, SPA and pNHA
- Pollardstown Fen (Ramsar Site no. 474) – located just north of Newbridge, County Kildare, approximately 12.9km south of the Proposed Project. Pollardstown Fen is also a designated SAC
- Clara Bog (Ramsar Site no. 415) – located between Tullamore and Clara, in County Offaly, 14.5km north of the Proposed Project. Clara Bog is also a designated SAC.

8.3.1.4 Nature Reserves

201. The footprint of the Proposed Project does not overlap with any Nature Reserves (NPWS 2018a). Five Nature Reserves occur within 15km of the Proposed Project. A 15km buffer was used as an initial screening exercise; sites within and beyond this 15km buffer were subsequently reviewed for source-pathway-receptor links. Of these five, four are also designated SACs, pNHAs and/or Ramsar sites; namely Slieve Bloom Mountains Nature Reserve, Clara Bog Nature Reserve, Raheenmore Bog Nature Reserve, and Pollardstown Fen Nature Reserve. The fifth Nature Reserve, Fiddown Island is located south of Birr, County Offaly, 3.5km west of the Proposed Project (Figure 8.3).

8.3.1.5 Designated Salmonid Waters

202. There are no designated salmonid waters (under the European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. No. 293/1988)) located within the Proposed Project. The closest designated salmonid water body is the River Boyne main channel (segment 07_803) which is located approximately 4.4km north-east of the Proposed Project in the Boyne Catchment. This watercourse is not directly connected to the Proposed Project and is indirectly connected via a network of small tributaries approximately 19km north of the Proposed Project.

8.3.2 Terrestrial Ecology

203. This section describes the ecological baseline as it relates to information identified as part of the desktop review and the results of field surveys, under the following headings:

- Terrestrial Habitats (Section 8.3.2.1)
 - Habitats and Flora
- Mammals (Section 8.3.2.2 to Section 8.3.2.5)
 - Bats
 - Eurasian Badger
 - Otter
 - Other Mammal Species
- Invertebrates (Section 8.3.2.6 and Section 8.3.2.7)

- Lepidoptera
- Molluscs
- Other Species Groups (Section 8.3.2.8)
 - Reptiles and Amphibians.

8.3.2.1 Terrestrial Habitats

8.3.2.1.1 Summary Description of Habitats

204. The Proposed Project extends from Parteen Basin on the River Shannon directly south of Lough Derg in County Tipperary, extending through Counties Offaly and Kildare, and terminating at Peamount Reservoir in County Dublin. The 38 kV Uprate Works elements of the Proposed Project are located in Counties Limerick, Clare and Tipperary.
205. In general, the majority of the habitats within the Proposed Project consist of improved agricultural grassland and arable crops, dissecting linear hedgerows and treelines, 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.
206. At the infrastructure sites, the habitats consisted mainly of improved and wet grassland as well as smaller pockets of broadleaved woodland and conifer plantation.
207. The Proposed Project crosses 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. For further detail on all watercourse crossings, refer to Section 8.3.3.
208. The habitats recorded within the Proposed Project are outlined in detail in Section 8.3.2.1.3 and are shown on Figure 8.4 to Figure 8.108.

8.3.2.1.2 Habitats and Flora – Desktop Review Results

8.3.2.1.2.1 Rare and/or Protected Habitats

209. A desktop review of habitats present within the 10km grid squares encompassing the Proposed Project was carried out utilising existing data from: NPWS Article 17 habitat data (NPWS 2019c), NPWS National Survey of Native Woodland 2003-2008 (Perrin *et al.* 2008), NPWS Ancient and Long-Established Woodland (NPWS 2025a), NPWS Irish Semi-Natural Grassland Survey 2007-2012 (Martin *et al.* 2013), and NPWS National Juniper Survey 2009-2012 (NPWS 2025a). Habitats recorded from the aforementioned sources are presented in Table 8.25.
210. A total of twenty-three habitats from NPWS Article 17 habitats data were noted throughout the 10km grid squares encompassing the Proposed Project. The majority of these habitats comprised degraded raised bog [7120], vegetation of flowing waters [3260], *Rhynchosporion* depressions [7150], and sessile oakland [91A0]. Seven priority habitats were recorded in the 10km grid squares encompassing the Proposed Project, which included blanket bog (active)* [7130], alluvial forests* [91E0], cladium fens* [7210], turloughs* [3180], orchid rich calcareous grassland* [6210], raised bogs (active)* [7110] and petrifying springs* [7220].

211. A review of the Irish Semi-Natural Grassland Survey 2007-2012 data found that the majority of grassland types within the Proposed Project consisted of GS4 – wet grassland, GA1 – improved agricultural grassland and GS1 – dry calcareous and neutral grassland. However, some grid squares (i.e. R67, R76, R77, R87, R88, R99, N31, N73 and N83) contained no grassland data.
212. Only one grid square, N10, contained a record of juniper at Island Fen SAC, Birr, County Offaly as part of the NPWS National Juniper Survey 2009-2012.
213. Forestry inventory data for broadleaved and conifer woodland illustrated most conifer woodlands comprised Norway spruce (*Picea abies*), Sitka spruce, mixed forest mature and lodgepole pine. Broadleaved woodlands consisted primarily of ash, mature other broadleaves, oak, alder, sycamore (*Acer pseudoplatanus*) and pedunculate oak.

Table 8.25: Desktop Review of Habitats Data Within the 10km Grid Squares Encompassing the Proposed Project

10km Grid Squares	NPWS Article 17 Habitats (Annex I Habitats)	National Survey of Native Woodland 2003-2008	Ancient and Long-Established Woodland	Irish Semi-Natural Grassland Survey 2007-2012	NPWS National Juniper Survey 2009-2012
R56	Blanket bog (active)* [7130] Degraded raised bog [7120] Sessile oakland [91A0] Dry heath [4030] Atlantic wet heath [4010] Hydrophilous tall-herb swamp [6430] <i>Molinia</i> meadows [6410] Vegetation of flowing waters [3260]	Not applicable	Garrannon Wood	GS4 – Wet grassland	No data
R66	Rhynchosporion depressions [7150] Degraded raised bog [7120] Sessile oakland [91A0] Alluvial forests* [91E0] Atlantic wet heath [4010] Hydrophilous tall-herb swamp [6430] <i>Molinia</i> meadows [6410] Vegetation of flowing waters [3260]	Oak-birch-holly woodland Wet willow-alder-ash woodland Bog woodland Riparian woodland	Glenomra Woods	GM1 – Marsh GA1 – Improved agricultural grassland GS4 – Wet grassland GS2 – Dry meadows and grassy verges	No data
R67	Blanket bog (active)* [7130] Degraded raised bog [7120] Sessile oakland [91A0] Alluvial forests* [91E0] Alpine and subalpine heath [4060] Dry heath [4030] Vegetation of flowing waters [3260] Rich pondweed lake habitat [3150]	Oak-ash-hazel woodland Wet pedunculate oak-ash woodland	No data	No data	No data
R76	Blanket bog (active)* [7130] Degraded raised bog [7120] Sessile oakland [91A0] Alpine and subalpine heath [4060] Atlantic wet heath [4010] Rhynchosporion depressions [7150] Calaminarian grasslands [6130] Vegetation of flowing waters [3260]	Wet willow-alder-ash woodland	No data	No data	No data

10km Grid Squares	NPWS Article 17 Habitats (Annex I Habitats)	National Survey of Native Woodland 2003-2008	Ancient and Long-Established Woodland	Irish Semi-Natural Grassland Survey 2007-2012	NPWS National Juniper Survey 2009-2012
R77	Rhynchosporion depressions [7150] Degraded raised bog [7120] Sessile oakland [91A0] Alpine and subalpine heath [4060] Dry heath [4030] Atlantic wet heath [4010] Vegetation of flowing waters [3260] Rich pondweed lake habitat [3150]	Oak-ash-hazel woodland	No data	No data	No data
R87	Degraded raised bog [7120] Alpine and subalpine heath [4060] Dry heath [4030] Atlantic wet heath [4010] Species-rich <i>Nardus</i> grassland [6230] Calaminarian grasslands [6130] Vegetation of flowing waters [3260]	Bog woodland	No data	No data	No data
R88	<i>Cladium fens</i> * [7210] Degraded raised bog [7120] Sessile oakland [91A0] Vegetation of flowing waters [3260] Rich pondweed lake habitat [3150]	Oak-ash-hazel woodland	Johnstown woodland, County Tipperary	No data	No data
R98	Rhynchosporion depressions [7150] <i>Cladium fens</i> * [7210] Transition mires [7140] Bog woodland* [91D0] Vegetation of flowing waters [3260]	Bog woodland Oak-ash-hazel woodland	Brownstown, County Offaly	GA1 – Improved agricultural grassland GS4 – Wet grassland	No data
R99	Raised bogs (active)* [7110] Alkaline fen [7230] <i>Cladium fens</i> * [7210] Rhynchosporion depressions [7150] Degraded raised bog [7120] Sessile oakland [91A0] Vegetation of flowing waters [3260] Turloughs* [3180]	Oak-ash-hazel woodland	No data	No data	No data

10km Grid Squares	NPWS Article 17 Habitats (Annex I Habitats)	National Survey of Native Woodland 2003-2008	Ancient and Long-Established Woodland	Irish Semi-Natural Grassland Survey 2007-2012	NPWS National Juniper Survey 2009-2012
S08	Raised bogs (active)* [7110] Alkaline fen [7230] Rhynchosporion depressions [7150] Degraded raised bog [7120] Vegetation of flowing waters [3260] Sessile oakland [91A0] Orchid rich calcareous grassland* [6210] Hay meadows [6510]	Oak-birch-holly woodland	No data	GA1 – Improved agricultural grassland GS4 – Wet grassland	No data
S09	Raised bogs (active)* [7110] Alkaline fen [7230] Rhynchosporion depressions [7150] Degraded raised bog [7120] Sessile oakland [91A0] Vegetation of flowing waters [3260]	Bog woodland Oak-birch-holly woodland (Mixed) broadleaved woodland Oak-ash-hazel woodland Conifer woodland	Ballincor Demesne Bogwood, County Offaly	GA1 – Improved agricultural grassland GS4 – Wet grassland GS2 – Dry meadows and grassy verges GS1 – Dry calcareous and neutral grassland	No data
N00	Raised bogs (active)* [7110] Alkaline fen [7230] Rhynchosporion depressions [7150] Degraded raised bog [7120] Transition mires [7140] Sessile oakland [91A0] Alluvial forests* [91E0] Orchid rich calcareous grassland* [6210] Vegetation of flowing waters [3260]	Bog woodland Oak-ash-hazel woodland Mixed broadleaved Conifer woodland Wet pedunculate oak-ash woodland	Woodville, County Offaly	GA1 – Improved agricultural grassland GS2 – Dry meadows and grassy verges GS1 – Dry calcareous and neutral grassland GS4 – Wet grassland	No data
N10	Raised bogs (active)* [7110] Alkaline fen [7230] Rhynchosporion depressions [7150] Degraded raised bog [7120] Sessile oakland [91A0] Juniper scrub [5130] Vegetation of flowing waters [3260]	Oak-ash-hazel woodland Mixed broadleaved Conifer woodland	Castle Bernard Demesne, County Offaly	GA1 – Improved agricultural grassland GS1 – Dry calcareous and neutral grassland GS4 – Wet grassland GS2 – Dry meadows and grassy verges	Island fen, Birr, County Offaly

10km Grid Squares	NPWS Article 17 Habitats (Annex I Habitats)	National Survey of Native Woodland 2003-2008	Ancient and Long-Established Woodland	Irish Semi-Natural Grassland Survey 2007-2012	NPWS National Juniper Survey 2009-2012
N11	Raised bogs (active)* [7110] Alkaline fen [7230] <i>Cladium fens</i> * [7210] Rhynchosporion depressions [7150] Degraded raised bog [7120] Transition mires [7140] Orchid rich calcareous grassland* [6210] Vegetation of flowing waters [3260]	Bog woodland, Oak-ash-hazel woodland, Wet willow-alder-ash woodland	Broughal, County Offaly Ballykealy, County Offaly Clooneen, County Offaly	GS1 – Dry calcareous and neutral grassland GS2 – Dry meadows and grassy verges	No data
N21	Raised bogs (active)* [7110] Alkaline fen [7230] Rhynchosporion depressions [7150] Degraded raised bog [7120] Sessile oakland [91A0] Vegetation of flowing waters [3260]	Bog woodland Oak-ash-hazel woodland (Mixed) broadleaved woodland Oak-birch-holly woodland	Clonad Wood, County Offaly	No data	No data
N31	Rhynchosporion depressions [7150] Degraded raised bog [7120] Vegetation of flowing waters [3260] Hard water lakes [3140]	Oak-ash-hazel woodland	No data	GA1 – Improved agricultural grassland GS1 – Dry calcareous and neutral grassland GM1 – Marsh	No data
N41	Raised bogs (active)* [7110] Rhynchosporion depressions [7150] Degraded raised bog [7120] Vegetation of flowing waters [3260]	Bog woodland	No data	GS4 – Wet grassland GS1 – Dry calcareous and neutral grassland	No data
N42	Alkaline fen [7230] Degraded raised bog [7120] Vegetation of flowing waters [3260]	Bog woodland	No data	GS2 – Dry meadows and grassy verges GS4 – Wet grassland GA1 – Improved agricultural grassland	No data
N52	Raised bogs (active)* [7110] <i>Cladium fens</i> * [7210] Rhynchosporion depressions [7150] Degraded raised bog [7120] Sessile oakland [91A0] Orchid rich calcareous grassland* [6210] Vegetation of flowing waters [3260]	Oak-birch-holly woodland Bog woodland Mixed broadleaved Conifer woodland Oak-ash-hazel woodland	Killinthomas Wood, County Kildare	GA1 – Improved agricultural grassland GS4 – Wet grassland GS2 – Dry meadows and grassy verges FS2 – Tall herb swamp	No data

10km Grid Squares	NPWS Article 17 Habitats (Annex I Habitats)	National Survey of Native Woodland 2003-2008	Ancient and Long-Established Woodland	Irish Semi-Natural Grassland Survey 2007-2012	NPWS National Juniper Survey 2009-2012
N62	Alkaline fen [7230] Rhynchosporion depressions [7150] Degraded raised bog [7120] Sessile oakland [91A0] Vegetation of flowing waters [3260]	Bog woodland Mixed broadleaved Conifer woodland Oak-birch-holly woodland Oak-ash-hazel woodland	No data	GS4 – Wet grassland GS2 – Dry meadows and grassy verges GA1 – Improved agricultural grassland	No data
N72	Raised bogs (active)* [7110] Rhynchosporion depressions [7150] Degraded raised bog [7120] Vegetation of flowing waters [3260]	Mixed broadleaved Conifer woodland Bog woodland	No data	No data	No data
N73	Rhynchosporion depressions [7150] Degraded raised bog [7120] Vegetation of flowing waters [3260]	Mixed broadleaved Oak-ash-hazel woodland	Donadea forest park, County Kildare	No data	No data
N83	Vegetation of flowing waters [3260] Petrifying springs* [7220]	Oak-birch-holly woodland	No data	GS1 – Dry calcareous and neutral grassland GS2 – Dry meadows and grassy verges GS4 – Wet grassland	No data
N92	Vegetation of flowing waters [3260]	Mixed broadleaved Oak-ash-hazel woodland	Carton Demesne, County Kildare Castletown, County Kildare	GS2 – Dry meadows and grassy verges	No data
N93	Hydrophilous tall-herb swamp [6430] Vegetation of flowing waters [3260]	Oak-ash-hazel woodland Mixed broadleaved	Luttrellstown County Dublin St. Catherines, County Dublin Abbotstown, County Dublin	GA1 – Improved agricultural grassland GS2 – Dry meadows and grassy verges GS4 – Wet grassland	No data
O03	Blanket bog (active)* [7130] Degraded raised bog [7120] Sessile oakland [91A0] Dry heath [4030] Atlantic wet heath [4010] Hydrophilous tall-herb swamp [6430] <i>Molinia</i> meadows [6410] Vegetation of flowing waters [3260]	Not applicable	Garrannon Wood	GS4 – Wet grassland	No data

8.3.2.1.2.2 Rare and/or Protected Flora

214. A desktop review was undertaken of updated rare and threatened protected flora species historical data received from NPWS in 2025 for the 10km grid squares encompassing the Proposed Project (as listed in Section 8.2.4.1). It should be noted the majority of records were over ten years old and may no longer represent current species distributions:

- **R56**
 - Small-white orchid (*Pseudorchis albida*)
 - Wood club-rush (*Scirpus sylvaticus*)
- **R66**
 - Annual knawel (*Scleranthus annuus*)
 - Meadow brome (*Bromus commutatus*)
 - Northern dead-nettle (*Lamium confertum*)
 - Small cudweed (*Filago minima*)
 - Smooth brome (*Bromus racemosus*)
- **R67**
 - Heath cudweed (*Gnaphalium sylvaticum*)
 - Opposite-leaved pondweed
- **R76**
 - Heath threadwort (*Cephaloziella stellulifera*)
- **R77**
 - Opposite-leaved pondweed
- **R87**
 - Basil thyme (*Clinopodium acinos*)
 - Greater copperwort (*Cephaloziella nicholsonii*)
 - Heath threadwort
 - Lead-moss (*Ditrichum plumbicola*)
 - Shepherd's-needle (*Scandix pecten-veneris*)
 - Small-white orchid
 - Twisting thread-moss (*Bryum torquescens*)
- **R88**
 - Autumn gentian (*Gentianella amarella*)
 - Broad-fruited cornsalad (*Valerianella rimosa*)
 - Golden dock (*Rumex maritimus*)
 - Green-winged orchid (*Anacamptis morio*)
- Opposite-leaved pondweed
- **R98**
 - Common wintergreen (*Pyrola minor*)
 - Dwarf mallow (*Malva neglecta*)
 - Irish spleenwort (*Asplenium onopteris*)
 - Marsh saxifrage (*Saxifraga hirculus*)
- **R99**
 - Autumn gentian
 - Fly orchid (*Ophrys insectifera*)
 - Irish whitebeam (*Sorbus hibernica*)
- **S08**
 - Wood bitter-vetch (*Vicia orobus*)
- **S09**
 - Brown beak-sedge (*Rhynchospora fusca*)
 - Pale toadflax (*Linaria repens*)
 - Slender cottongrass (*Eriophorum gracile*)
- **N00**
 - Autumn gentian
 - Autumn lady-tresses (*Spiranthes spiralis*)
 - Brown beak-sedge
 - Dwarf spurge (*Euphorbia exigua*)
 - Fir clubmoss (*Huperzia selago*)
 - Green-winged orchid
 - Henbane (*Hyoscyamus niger*)
 - Yellow bird's-nest (*Monotropa hypopitys*)
- **N10**
 - Frog orchid (*Coeloglossum viridae*)
 - Green-winged orchid
 - Least bur-reed (*Sparganium natans*)

- **N11**
 - Green-winged orchid
 - Shepherd's-needle
- **N21**
 - Basil thyme
 - Dwarf spurge
 - Fly orchid
 - Wood bitter-vetch
- **N31**
 - Irish whitebeam
- **N42**
 - Green-winged orchid
 - Opposite-leaved pondweed
 - *Sphagnum denticulatum*
- **N52**
 - Basil thyme
 - Green-winged orchid
- **N62**
 - Basil thyme
 - Frog orchid
 - Green-winged orchid
 - *Pyrola rotundifolia subsp. rotundifolia*
 - Red hemp-nettle (*Galeopsis angustifolia*)
- **N72**
 - Basil thyme
 - Cornish heath (*Erica vagans*)
 - Opposite-leaved pondweed
 - Upright brome (*Bromopsis erecta*)
- **N73**
 - Bog orchid (*Hammarbya paludosa*)
- **N92**
 - Darnel (*Lolium temulentum*)
 - Green figwort (*Scrophularia umbrosa*)
 - Northern dead-nettle
 - Opposite-leaved pondweed
 - Red hemp-nettle
 - Shepherd's-needle
 - Upright brome
- **N93**
 - *Gentianella amarella subsp. hibernica*
 - Green figwort
 - Green-winged orchid
 - Hairy St. John's-wort (*Hypericum hirsutum*)
 - Hairy violet (*Viola hirta*)
 - Henbane
 - Opposite-leaved pondweed
 - Red hemp-nettle
 - Shepherd's-needle
 - Upright brome
- **O03**
 - Basil thyme
 - Betony (*Stachys officinalis*)
 - Dwarf mallow
 - Dwarf spurge
 - Field gentian (*Gentianella campestris*)
 - *Gentianella amarella subsp. hibernica*
 - Green figwort
 - Hairy St. John's-wort
 - Hairy violet
 - Henbane
 - Irish whitebeam
 - Meadow barley (*Hordeum secalinum*)
 - Opposite-leaved pondweed
 - Red hemp-nettle
 - Shepherd's-needle
 - Upright brome
 - Yellow bird's-nest

215. Rare and/or protected flora data for the 10km grid squares encompassing the Proposed Project were also reviewed to establish the distribution and occurrence of the 68 species listed as FPO species on the 2015 Flora Protection Order Schedule (Government of Ireland 2015), and the 106 species listed on the Ireland Red List (Wyse Jackson *et al.* 2016), and identify areas as having potential habitat to support rare plant species. Data were obtained from the NBDC 'Threatened Species' dataset, Botanical Society of Britain and Ireland (BSBI) FPO and Irish Red List data (Appendix A8.5: Rare Plants Survey Report).
216. A subsequent review was undertaken of the species listed as FPO species on the 2022 Flora Protection Order Schedule (Government of Ireland 2022). This update added a further 25 vascular plant species to the protected flora list. Examination of the distribution of these species found that most grow in habitats which do not occur within or close to the Proposed Project (e.g. upland or coastal habitats). The only species which was recently recorded within proximity to the Proposed Project is common wintergreen (*Pyrola minor*). *Pyrola minor* is a species of woodland and/or scrub habitat and therefore it is very unlikely to occur within the Proposed Project as the hectad in which it is known to occur (one recent record for hectad S19, approximately 3km north-east of Roscrea, and greater than 1km from the Proposed Project), goes through mainly grassland areas within the Proposed Project.
217. In total, 43 FPO or Irish Red List flora species were recorded in the NBDC or BSBI datasets as occurring within the grid squares enveloping the Proposed Project. One or more FPO or Irish Red List flora species were recorded in every grid square within the Proposed Project. The results are presented in Table 8.26.
218. Following the identification of flora species within a grid square, a review of suitable habitat within the Proposed Project was conducted to assess the likelihood of a species presence within the Proposed Project. The likelihood of occurrence is also presented in Table 8.26.
219. It is noted that one of the species of interest on the 2015 Flora Protection Order, basil thyme (*Clinopodium acinos*), is no longer listed as protected on the 2022 Flora Protection Order. This change is likely associated with recent information regarding its wider distribution in Ireland.

Table 8.26: Desktop Review Records of Flora Protection Order Species and Red Listed Flora Within the Grid Squares Encompassing the Proposed Project

Common Name	Scientific Name	Species Status	Most Recent Record Year		Grid Square(s)	Suitable Habitat Within Proposed Project	Likelihood of Occurrence Within Proposed Project
			NBDC	BSBI			
Corncockle	<i>Agrostemma githago</i>	Red Listed species (WT)	Not applicable	1950-1969	N62, N93, O03, R87	Arable weed historically present in cornfields. Likely introduced via wildflower seed mixes.	Unlikely
Chives	<i>Allium schoenoprasum</i> *	FPO & Red Listed species (VU)	Not applicable	2000-2009	N00	No suitable habitat present.	None
Irish Spleenwort	<i>Asplenium onopteris</i>	Red Listed species (VU)	Not applicable	Pre-1930	R98	No suitable habitat present.	Unlikely
Forked Spleenwort	<i>Asplenium septentrionale</i> *	FPO & Red Listed species (VU)	2005	2010-2019	R77	Unknown.	None
Nettle-leaved Bellflower	<i>Campanula trachelium</i>	Red Listed species (LC)	2020	2000-2009	N41, R88	Suitable habitat present. Typically found in wooded riverbanks in the south-east.	Unlikely
Cornflower	<i>Centaurea cyanus</i>	Red Listed species (WL)	2008	2010-2019	N10, O03, R87, R88	Suitable habitat present. Almost extinct, likely introduced via wildflower seed mixes.	Possible
Rough Chervil	<i>Chaerophyllum temulum</i>	Red Listed species (VU)	Not applicable	1950-1969	N73, R67, R88	Suitable habitat present. Typically found in hedges and roadsides in south and east of Ireland.	Unlikely
Good King Henry	<i>Blitum bonus-henricus</i>	Red Listed species (VU)	2019	1987-1999	N92, R88, R98, R99	Suitable habitat present. Roadsides and waste places.	Possible
Basil Thyme	<i>Clinopodium acinos</i>	Red Listed species (NT)	2017	2010-2019	N21, N52, N62, N72, N73, O03, R87	Suitable habitat present. Typically found in field margins and exposed sand, gravel or till.	Confirmed
Green-flowered helleborine	<i>Epipactis phyllanthos</i>	Red Listed species (EN)	2000-2010	2000-2009	N00, N93	Suitable habitat present.	Possible
Cornish Heath	<i>Erica vagans</i>	Red Listed species (CR)	2019	2000-2009	N72	Suitable habitat present.	Confirmed
Blue Fleabane	<i>Erigeron acer</i>	Red Listed species (LC)	Not applicable	2010-2019	N00, N10, N11, N21, N31, N42, N52, N62, N92, N93, O03, R87, R88, R98, S08	Suitable habitat present. Typically found in dry pastures, eskers and sandy or gravelly places.	Confirmed
Slender Cotton Grass	<i>Eriophorum gracile</i> *	FPO & Red Listed species (NT)	2003	2010-2019	S09	Suitable habitat present. Typically found in bogs and fens.	Possible

Common Name	Scientific Name	Species Status	Most Recent Record Year		Grid Square(s)	Suitable Habitat Within Proposed Project	Likelihood of Occurrence Within Proposed Project
			NBDC	BSBI			
Common Cudweed	<i>Filago germanica</i>	Red Listed species (VU)	2019	2000-2009	N31, N73	Limited suitable habitat. Typically found in dry banks and sandy ground.	Unlikely
Dropwort	<i>Filipendula vulgaris</i>	Red Listed species (LC)	2019	Not applicable	N42	Suitable habitat present. Typically found in rocky pastures on limestone and semi-natural woodland.	Possible
Alder Buckthorn	<i>Frangula alnus</i>	Red Listed species (LC)	Not applicable	2010-2019	N11, N21, N31, N41, N42, N52, N62, N72, N73, S09	Suitable habitat present. Typically found in limestone pavement, hedgerows, fens, and boggy places.	Confirmed
Red Hemp Nettle	<i>Galeopsis angustifolia</i> *	FPO & Red Listed species (VU)	Not applicable	1987-1999	N62, N93, O03, R87	Suitable habitat may be present. Typically found in calcareous gravel.	Unlikely
Heath Cudweed	<i>Omalotheca sylvatica</i> *	FPO & Red Listed species (EN)	1987-1999	Pre-1930	R76	No suitable habitat.	None
Opposite-leaved Pondweed	<i>Groenlandia densa</i> *	FPO & Red Listed species (NT)	Not applicable	2010-2019	N42, N72, N92, N93, O03, R67, R77, R88	Suitable habitat present. Typically found in rivers, canals, estuarine muds.	Confirmed
Bog Orchid	<i>Hammarbya paludosa</i> *	FPO & Red Listed species (NT)	1922	Pre-1930	N73, R67, R88	No suitable habitat.	None
Meadow Barley	<i>Hordeum secalinum</i>	FPO & Red Listed species (VU)	2019	Pre-1930	O03	No suitable habitat.	None
Fir Clubmoss	<i>Huperzia selago</i>	Red Listed species (LC)	2021	2019-2019	N00, N10, N11, N31, N52, N62, N73, S09, R66	Suitable habitat present. Typical habitat mountain cliffs, wet heath, sometimes lowland bogs.	Possible
Hairy St. John's Wort	<i>Hypericum hirsutum</i> *	FPO & Red Listed species (VU)	2019	2000-2019	N83, N92, O03	Suitable habitat present. Typically found in woody and shady places.	Possible
Yellow Archangel	<i>Lamiastrum galeobdolon subsp. montanum</i>	Red Listed species (LC) (R)	Not applicable	2010-2019	N93, O03	Suitable habitat present. Restricted range. Typically found in woodlands and hedgerows.	Possible
Darnel	<i>Lolium temulentum</i>	Red Listed species (EN)	2008	Pre-1930	N92	No suitable habitat.	None
Small Cow-wheat	<i>Melampyrum sylvaticum</i>	Red Listed species (EN)	2019	Not applicable	R67	No suitable habitat.	None

Common Name	Scientific Name	Species Status	Most Recent Record Year		Grid Square(s)	Suitable Habitat Within Proposed Project	Likelihood of Occurrence Within Proposed Project
			NBDC	BSBI			
Green-winged orchid	<i>Orchis morio</i>	Red Listed species (VU)	Not applicable	2020 onwards	N00, N10, N11, N21, N31, N41, N42, N52, N62, N92, N93, R67, R88, R98, S9, R66	Suitable habitat present. Typically found meadows, pastures and sand hills.	Possible
Prickly Poppy	<i>Papaver argemone</i>	Red Listed species (VU)	Not applicable	Pre-193	R98	Limited suitable habitat. Typically found in sandy and gravelly ground.	Possible
Small-white Orchid	<i>Pseudorchis albida</i> *	FPO & Red Listed species (VU)	Not applicable	1987-1999	R87, R56	No suitable habitat.	None
Round-leaved Wintergreen	<i>Pyrola rotundifolia</i> subsp. <i>Rotundifolia</i>	Red Listed species (NT)	2011	2010-2019	N52, N62	Limited suitable habitat. Typically found in quaking bogs and fens in the centre.	Unlikely
Golden Dock	<i>Rumex maritimus</i>	Red Listed species (NT)	1987-1999	2010-2019	R88	Suitable habitat. Typically found by lakes and ponds subject to fluctuations in water levels.	Unlikely
Fiddle Dock	<i>Rumex pulcher</i>	Red Listed species (VU)	Not applicable	1950-1969	R87	No suitable habitat.	Unlikely
Marsh Saxifrage	<i>Saxifraga hirculus</i> *	FPO & Red Listed species (NT)	Not applicable	1950-1969	R98	No suitable habitat.	None
Annual Knawel	<i>Scleranthus annuus</i>	FPO & Red Listed species (VU)	Not applicable	1970-1986	R66	Suitable habitat present. Grows in soil pockets among rocks, on bare places, in arable fields, in quarries, or beside rivers.	None
Green Figwort	<i>Scrophularia umbrosa</i>	Red Listed species (NT)	2020	2010-2019	N72, N83, N92, N93, O03	Suitable habitat present. Typically found on riverbanks, frequent along River Liffey.	Possible
Irish Whitebeam	<i>Sorbus hibernica</i>	Red Listed species (VU)	2000-2010	2010-2019	N00, N10, N11, N21, N41, N72, O03, R88, R98, R99, S09, S08	Suitable habitat present. Typically found in woods, cliffs, and rocky places.	Possible
Betony	<i>Stachys officinalis</i> *	FPO & Red Listed species (NT)	Not applicable	2010-2019	R88	Suitable habitat may be present. Typically found in woods and bushy places.	Possible
Narrow-fruited Cornsalad	<i>Valerianella dentata</i>	Red Listed species (VU)	Not applicable	1987-1999	N00, N92, O03	Suitable habitat may be present. Typically found in tilled fields in the south of Ireland.	Unlikely
Broad-fruited Cornsalad	<i>Valerianella rimosa</i>	Red Listed species (CR)	Not applicable	1950-1969	N11, N31, N41, R88, R98	Suitable habitat may be present. Typically found in tilled fields in the south and east of Ireland.	Unlikely
Spring Vetch	<i>Vicia lathyroides</i>	Red Listed species (LC)	2012	Not applicable	O03	No suitable habitat.	None

Common Name	Scientific Name	Species Status	Most Recent Record Year		Grid Square(s)	Suitable Habitat Within Proposed Project	Likelihood of Occurrence Within Proposed Project
			NBDC	BSBI			
Wood Bitter Vetch	<i>Vicia orobus</i> *	FPO & Red Listed species (VU)	2002	2010-2019	N21, S08	No suitable habitat.	None
Hairy Violet	<i>Viola hirta</i> *	FPO & Red Listed species (VU)	Not applicable	1987-1999	N93, O03	No suitable habitat.	Unlikely
Mountain Pansy	<i>Viola lutea</i>	Red Listed species (VU)	Not applicable	Pre-1930	N92	No suitable habitat.	None

Note:

CR: Critically Endangered; EN: Endangered; VU: Vulnerable; NT: Near Threatened; LC: Least Concern; WL: Waiting List. * indicates FPO species.

8.3.2.1.2.3 Invasive Non-Native Species

220. A desktop review of NBDC records of invasive non-native terrestrial flora was carried out for the 10km grid squares encompassing the Proposed Project, as presented in Table 8.27. From the review of NBDC records a total of 30 INNS were noted, of which 11 are listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) (as amended). These 11 species are:

- Parrot's-feather (*Myriophyllum aquaticum*) (semi-aquatic species)
- Giant hogweed (*Heracleum mantegazzianum*)
- Giant knotweed (*Fallopia sachalinensis*)
- Giant-rhubarb (*Gunnera tinctoria*)
- Himalayan balsam (*Impatiens glandulifera*)
- Japanese knotweed (*Reynoutria japonica*)
- Rhododendron (*Rhododendron ponticum*)
- American skunk-cabbage (*Lysichiton americanus*)
- Himalayan knotweed (*Persicaria wallichii*)
- Three-cornered leek (*Allium triquetrum*)
- Spanish bluebell (*Hyacinthoides hispanica*).

Table 8.27: Records of Invasive Non-Native Terrestrial Flora Within the 10km Grid Squares Encompassing the Proposed Project

Grid Square	Species Group	Species Name	Record count	Title of Dataset	Designation
R56, N00, O03	Flowering Plant	American skunk-cabbage (<i>Lysichiton americanus</i>)	1, 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 (<i>Ribes nigrum</i>)	4, 1, 1, 1	Species Data from the National Vegetation Database Ireland's BioBlitz	Medium Impact Invasive Species
R66, R87, R98, N00, N10, N42, N52, N72, N73, N83, N92, N93, O03	Flowering Plant	Butterfly-bush (<i>Buddleja davidii</i>)	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 (<i>Conyza canadensis</i>)	1, 1	Online Atlas of Vascular Plants 2012-2020 BSBI tetrad data for Ireland	Medium Impact Invasive Species
R77, R98, S09, N00, N10, N21, N31, N41, N42, N73, N83, N93, O03	Flowering Plant	Cherry laurel (<i>Prunus laurocerasus</i>)	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 (<i>Orobanche minor</i>)	1, 1, 1	Online Atlas of Vascular Plants 2021-2020	Medium Impact Invasive Species
S09, N11, N62, N83, N93, O03	Conifer	Douglas fir (<i>Pseudotsuga menziesii</i>)	1, 2, 2, 1, 2, 3	Species Data from the National Vegetation Database	Medium Impact Invasive Species
S09, N00, N31	Flowering Plant	Evergreen oak (<i>Quercus ilex</i>)	1, 1, 1	Species Data from the National Vegetation Database	Medium Impact Invasive Species
N00, O03	Flowering Plant	False-acacia (<i>Robinia pseudoacacia</i>)	1, 1	Heritage Trees of Ireland Species Data from the National Vegetation Database	Medium Impact Invasive Species
R56, R66, R76, N00, N92, N93, O03	Flowering Plant	Giant hogweed (<i>Heracleum mantegazzianum</i>)	6, 24, 6, 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 (<i>Fallopia sachalinensis</i>)	1, 5	National Invasive Species Database	High Impact Invasive Species; Regulation S.I. 477 (Ireland)
R76, R98, S09, N00, N10, O03	Flowering Plant	Giant-rhubarb (<i>Gunnera tinctoria</i>)	1, 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)
R56, R66, R77, N00, N10, N21, N42, N92, N93, O03	Flowering Plant	Himalayan balsam (<i>Impatiens glandulifera</i>)	3, 4, 2, 31, 7, 1, 2, 42, 145, 29	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
R66, R67, R77, R88, N00, N31, N72, S09, O03	Flowering Plant	Himalayan honeysuckle (<i>Leycesteria formosa</i>)	1, 2, 2, 1, 2, 1, 1, 1, 5	Online Atlas of Vascular Plants 2012 Onwards	Medium Impact Invasive Species
R56, R66, R67, R76, R87, R88	Flowering Plant	Himalayan knotweed (<i>Persicaria wallichii</i>)	1, 5, 1, 4, 1, 2, 2	National Invasive Species Database Online Atlas of Vascular Plants 2012 Onwards	Medium Impact Invasive Species; Regulation S.I. 477 (Ireland)
R56, R66, R67, R76, R77, R87, R88, R98, R99, S08, S09, N00, N10, N21, N31, N42, N62, N72, N73, N92, N93, O03	Flowering Plant	Japanese knotweed (<i>Reynoutria japonica</i>)	12, 13, 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 (<i>Rosa rugosa</i>)	2	Discrete Vascular Plant Surveys	Medium Impact Invasive Species
N00	Flowering Plant	Pampas-grass (<i>Cortaderia selloana</i>)	1	Online Atlas of Vascular Plants 2021-2020	Medium Impact Invasive Species
N00, N11	Flowering Plant	Parrot's-feather (<i>Myriophyllum aquaticum</i>)	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 (<i>Sarracenia purpurea</i>)	8	Discrete Vascular Plant Surveys	Medium Impact Invasive Species
R66, R67, R76, R77, R88, R98, R99, S09, N00, N10, N11, N21, N31, N41, N42, N52, N72, N73, N83, N93, O03	Flowering Plant	Rhododendron (<i>Rhododendron ponticum</i>)	4, 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 (<i>Fallopia baldschuanica</i>)	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 (<i>Hyacinthoides hispanica</i>)	1, 2, 2, 42, 1, 1, 2	Discrete Vascular Plant Surveys Online Atlas of Vascular Plants 2012 Onwards	Regulation S.I. 477 (Ireland)
R56, R66, R67, R76, R77, R87, R88, R98, R99, S09, N00, N10, N11, N21, N31, N41, N42, N52, N62, N72, N73, N83, N92, N93, O03	Flowering Plant	Sycamore (<i>Acer pseudoplatanus</i>)	4, 9, 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

Grid Square	Species Group	Species Name	Record count	Title of Dataset	Designation
R66, R77, N00, N92, N93, O03	Flowering Plant	Three-cornered leek (<i>Allium triquetrum</i>)	3, 1, 10, 1,2, 11	Online Atlas of Vascular Plants 2012 Onwards	Medium Impact Invasive Species; Regulation S.I. 477 (Ireland)
R66, S09, N00, N10, N31, N93, O03	Flowering Plant	Traveller's-joy (<i>Clematis vitalba</i>)	2, 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 (<i>Ailanthus altissima</i>)	1	Heritage Trees of Ireland	Medium Impact Invasive Species
N10	Flowering Plant	Two-spined acaena (<i>Acaena ovalifolia</i>)	1	BSBI tetrad data for Ireland	Medium Impact Invasive Species
R99, N72	Flowering Plant	Wall cotoneaster (<i>Cotoneaster horizontalis</i>)	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 (<i>Pastinaca sativa</i>)	2	Online Atlas of Vascular Plants 2012-2020	Medium Impact Invasive Species

8.3.2.1.3 Habitats and Flora – Field Survey Results

221. Habitats identified within the Proposed Project during field surveys were categorised in accordance with Fossitt (2000) and are described in Table 8.28.
222. The recorded habitats were mapped and are shown on Figure 8.4 to Figure 8.108 for the Proposed Project. The ecological importance of each habitat was evaluated in accordance with NRA (2009a) guidelines (Table 8.17), which sets out the importance of the resource/receptor in a geographic site-based context.

Table 8.28: Habitats Recorded Within the Proposed Project During Field Surveys

Habitat Category			Coverage Within Proposed Project		Importance	Distribution
Name	Fossitt Code	Description	ha or m	%		
Arable crops	BC1	Agricultural land that is cultivated and managed for the production of arable crops.	146ha	11.87%	Local importance (lower value)	Recorded throughout the Proposed Project.
Tilled land	BC3	Bare land that has been tilled or prepared for planting.	12.43ha	1.01%	Local importance (lower value)	Recorded throughout the Proposed Project.
Stone walls and other stonework	BL1	Built stone structures.	0.03ha / 282.66m	0.002% / 0.16%	Local importance (lower value)	Encountered infrequently within the Proposed Project, as hedgerows or treelines predominantly delineating field boundaries. Species present included ivy hart's-tongue fern (<i>Asplenium scolopendrium</i>) and bramble.
Earth banks	BL2	Vegetated and non-vegetated earth banks that delineate field boundaries, often associated with hedgerows.	0.04ha / 109.77m	0.003% / 0.06%	Local importance (lower value)	Recorded infrequently throughout the Proposed Project and were generally a secondary habitat to hedgerows and treelines.
Buildings and artificial surfaces	BL3	All existing built access tracks (gravel/hardcore), as well as public roads and private and commercial dwellings or buildings.	33.05ha / 667.43m	2.69% / 0.38%	Local importance (lower value)	Recorded throughout the Proposed Project, most commonly where landowners have built access tracks through their land.
Buildings and amenity grassland mosaic	BL3/GA2	Includes buildings, artificial surfaces with amenity grassland.	0.70ha	0.06%	Local importance (lower value)	Recorded infrequently throughout the Proposed Project. Commonly found in areas of domestic buildings and lawns (amenity grassland).
Exposed sand, gravel or till	ED1	Includes natural or artificial exposures of unconsolidated coarse or mixed sediment	73.95m	0.04%	Local importance (lower value)	This habitat was recorded on one occasion within the Proposed Project within the townland of Rathfoston, County Offaly near Chainage TWC – 12000.
Spoil and bare ground	ED2	Category is associated with heaps of spoil and rubble. It mainly describes heaps of gravel stockpiled by individuals or temporary hardstand areas.	0.5ha	0.04%	Local importance (lower value)	Recorded on several occasions within the Proposed Project all within County Tipperary.
Recolonising bare ground	ED3	Areas of bare, or disturbed ground that is being re-colonised by herbaceous plants.	0.78ha / 204.10m	0.06% / 0.12%	Local importance (lower value)	Recorded on twenty-five occasions throughout the Proposed Project.
Active quarries and mines	ED4	For all active rock or sediment quarries (including gravel pits) and mines, or parts of these, where levels of disturbance are so high that colonisation by plants and animals is almost entirely prevented.	0.86ha	0.07%	Local importance (lower value)	This habitat was recorded from polesets 73B to 76B. The quarry was active, and access was restricted for surveyors for safety reasons. A walking tour showed that the quarry was actively used for sand and gravel extraction. The quarry had steep sides and large spoil heaps were located in adjacent fields. This habitat is shown on Figure 8.8.
Reservoirs	FL7	All open water bodies that are used for the storage and supply of water.	0.60ha	0.05%	Parteen Basin forms part of the Lower River Shannon SAC. This water body is therefore of international importance.	Parteen Basin is the only habitat of this type within the Proposed Project. Parteen Basin is 340ha in size. A small section of this (0.6ha) is located within the Proposed Project. It is a HMWB (Lough Derg from Killaloe Bridge to Parteen Weir) and acts as an artificial reservoir for power production at Ardnacrusha Generating Station (WFD Ireland 2010).
Other artificial lakes and ponds	FL8	Artificial lakes and ponds, used to describe natural depressions and pond areas.	0.18ha	0.01%	Local importance (lower value)	This habitat was recorded on eight occasions within the Proposed Project near Chainages TWA – 16600, TWB – 5200, TWC – 12500, TWC – 14000, TWD – 24300, TW – 22500, between Chainages TWD – 7400 and TWD – 7600 and on the OHL south of TWC - 13300.
Eroding/upland rivers	FW1	Natural watercourses that are eroding in nature, rather than depositing, and are typically associated with the upland sections of river catchments. The substrate usually comprises rocks, pebbles and gravels, with finer sediments rarely deposited.	2,161.33m	1.24%	Local importance (higher value)	Twenty-nine upland eroding/upland rivers are crossed by the Proposed Project. Further details on each of these river crossings are provided in Section 8.3.3.1.2 and their locations are shown in Figure 8.4 to Figure 8.108 and described in Appendix A8.14 (Watercourse Crossing Data).
Depositing/lowland rivers	FW2	Depositing rivers include watercourses where fine sediments are deposited on the riverbed and are typical of lowland areas.	4,058.02ha	2.33%	Local importance (higher value). River Shannon is designated as a SAC which is of international importance, however none of the qualifying Annex I habitats are present within the study area of the proposed 38 kV Uprate Works.	Sixty depositing/lowland rivers are crossed by the Proposed Project, including the Lower River Shannon between polesets 66B and 67B. Further details on each of these river crossings are provided in Section 8.3.3.1.2 and their locations are shown in Figure 8.4 to Figure 8.108 and described in Appendix A8.14 (Watercourse Crossing Data).
Canals	FW3	Canals are artificial linear bodies of water that were originally constructed for the purpose of navigation.	167.82m	0.10%	The Headrace is considered to be of local importance (higher value) The Grand Canal is a pNHA, therefore this habitat is of national importance.	The Proposed Project crosses the Headrace (PSNWBX005) between polesets 64B and 65B and crosses the Grand Canal on three occasions, twice at Kilpatrick, County Kildare at Chainage TWD – 15000 (WBX078 and WBX109) and at Colganstown, County Dublin at Chainage TWE – 14200 (WBX088).
Drainage ditches	FW4	Drainage ditches found to support protected species were assigned local importance (higher value) or county importance, as relevant.	56,559.50m	32.53%	Local importance (lower value)	This habitat type was found throughout the Proposed Project, where it has facilitated land drainage. In total, 546 drainage ditches were recorded within the Proposed Project, totalling 56,559.50m. Of the drainage ditches recorded, 172 were noted as having flow or water present.
Improved agricultural grassland	GA1	Intensively managed grasslands that have been reseeded and/or regularly fertilised. The agricultural grasslands recorded within the Proposed Project are mainly used for grazing/silage making and are dominated by perennial ryegrass (<i>Lolium perenne</i>). Some areas were also found to support abundant rushes due to poorly drained soils.	697.7ha	56.72%	Local importance (lower value)	Agricultural grassland was by far the most dominant habitat encountered throughout the Proposed Project.

Habitat Category			Coverage Within Proposed Project		Importance	Distribution
Name	Fossitt Code	Description	ha or m	%		
Improved agricultural grassland and dry meadows and grassy verges mosaic	GA1/GS2	Mosaic habitat of improved and meadow grassland.	10.37ha	0.84%	Local importance (lower value)	This habitat was recorded on nine occasions; two occasions at the BPT and also along the access road, TWA – 0, TWA – 200, TW – 2600, TW – 2700, and between Chainages TWB – 9300 and TWB – 9500 and between Chainages TW – 3300 and TW - 3400.
Improved agricultural grassland and wet grassland mosaic	GA1/GS4	Wet or waterlogged agricultural grassland.	15.08ha	1.23%	Local importance (lower value)	This habitat was recorded intermittently throughout. These habitats were usually dominated by agricultural grasses such as perennial ryegrass and/or meadow grass with an occasional and frequent presence of rushes, grasses and broadleaved herbs.
Amenity grassland (improved)	GA2	Improved, or species-poor, grassland that is managed for purposes other than grass production such as recreational or landscaped grassland (gardens, parks etc.).	0.27ha	0.02%	Local importance (lower value)	Recorded occasionally throughout the Proposed Project and mainly describes private gardens.
Dry calcareous and neutral grassland	GS1	Unimproved or semi-improved dry grassland that may be either calcareous or neutral and tends to be associated with low intensity agricultural and free-draining mineral soils. Species include a range of grasses and broadleaved herbs.	1.49ha	0.12%	Local importance (higher value)	This habitat occurred in discrete pockets along the Proposed Project, at poleset 94B, between polesets 70B and 71B, between Chainages TWA – 17400 and TWA – 17500 and TWB - 9100. None of the areas of GS1 encountered had a high species diversity. Species included a range of grasses and broadleaved herbs. These habitats did not conform with Annex I habitat criteria for 'calcareous grassland' ('orchid-rich' (6210), 'juniper scrub' (5130) or 'Calaminarian grasslands' (6130).
Dry meadows and grassy verges	GS2	This type of grassland is rarely fertilised or grazed and rarely mown.	21.12ha / 327.01m	1.72% / 0.19%	Local importance (lower value)	It is rare to find large meadows that are unimproved in Ireland; therefore, this type of grassland is now more typically associated with grassy roadside verges, railway embankments or some neglected fields or gardens. Within the Proposed Project, this habitat was found mainly along roadsides and occurred infrequently in discrete pockets. None of the areas of GS2 encountered were noted as having a high species diversity.
Dry meadows and grassy verges and wet grassland mosaic	GS2/GS4	Grassland which is rarely fertilised which also occurs in wet/waterlogged soil.	2.46ha	0.2%	Local importance (lower value)	This habitat was recorded on seven occasions within the Proposed Project at polesets 104B and 251, Chainage RW – 600, at Chainage TW – 14500, TWA – 8000, TWA - 3900 and near Chainage TWD – 21400.
Dry meadows and grassy verges, dense bracken and scrub mosaic	GS2/HD1/WS1	Mosaic habitat consisting of grassland with dense bracken and scrub present.	0.44ha	0.04%	Local importance (lower value)	This habitat was recorded on one occasion in Cushaling, County Offaly between Chainage TWD – 9700 and TWD – 10300.
Dry meadows and grassy verges and recolonising bare ground mosaic	GS2/ED3	Areas of recolonising bare ground transitioning into dry meadows and grassy verges.	0.74ha	0.06%	Local importance (lower value)	This habitat was recorded on two occasions near Chainages TWC – 20300 and along the R494 connecting the 38 kV and the RWI&PS.
Dry-humid acid grassland	GS3	Unimproved or semi-improved grassland that occurs on free-draining acid soils that may be dry or humid but not waterlogged.	3.52ha	0.29%	Local importance (higher value)	This habitat occurred in pockets in Knockbrack Upper between polesets 35B and 37B and Derrylahen at Chainage TWD – 26900 and between Chainages TWD – 27300 and TWD - 27500. This habitat did not conform with the Annex I habitat criteria for 'Species-rich Nardus grasslands' (6230) or 'Calaminarian grasslands' (6130).
Wet grassland	GS4	Occurs in wet or waterlogged mineral or organic soils that are poorly drained or subject to periodic flooding. It includes areas of poorly drained farmland that have not recently been improved.	70.75ha	5.75%	Local importance (higher value)	This habitat type was widespread throughout the Proposed Project and was the most common habitat recorded where the proposed 38 kV Uprate Works intersects the Lower River Shannon SAC. In most cases this habitat was semi-improved and species-poor and was characterised by soft rush (<i>Juncus effusus</i>) and thistle. Other species recorded included sweet vernal-grass (<i>Anthoxanthum odoratum</i>), bulrush and flag iris (<i>Iris pseudacorus</i>). These habitats are of local importance (lower value); however potential cover from rushes can be of some benefit in providing cover for birds such as snipe, curlew and redshanks (Royal Society for the Protection of Birds (RSPB) 2013). In more species-rich areas, a richer diversity of broadleaved species such as silverweed (<i>Potentilla anserina</i>), meadowsweet (<i>Filipendula ulmaria</i>), water mint (<i>Mentha aquatica</i>), black sedge (<i>Carex nigra</i>) and occasionally, heath spotted orchid (<i>Dactylorhiza maculata</i>), were also present. These habitats are of local importance (higher value). The WTP site is dominated by GS4. A range of botanical surveys were undertaken throughout the site. The results from these surveys are summarised as follows. The site was classified as a species poor GS4 with the entire site grazed by cattle. Smooth rush (<i>Juncus effusus</i>) was abundant throughout the site, with Yorkshire fog (<i>Holcus lanatus</i>), white clover (<i>Trifolium repens</i>), creeping buttercup (<i>Ranunculus repens</i>), ragwort (<i>Senecio jacobaea</i>) and marsh thistle (<i>Cirsium palustre</i>) (Appendix A8.4: Target Habitat Surveys Report). Nineteen macrofungal species were recorded at the site (Appendix A8.6: Fungi Survey Report). The majority of species were saprobes found on wood, soil or cattle dung. Most of these were found in the hedgerows surrounding the fields that dominate the site. Surprisingly few species were found in the pasture habitat. The most noteworthy species found in the pasture was <i>Cordyceps militaris</i>, a fungal parasite of moth pupae in soil, which is common but frequently overlooked. All of the species found on the WTP site were common species and the overall macrofungi diversity was low. In total, 38 lichen species were recorded (Appendix A8.7: Lichen Survey Report). The conservation value for all recorded species was 'Least Concern'. A total of 50 bryophytes were recorded at the WTP site; 41 mosses and nine liverworts (Appendix A8.8: Bryophyte Survey Report). This is a moderate species diversity for a small lowland grassland site in the west of the country. The majority of the species recorded were from the hedgerows and associated banks and ditches and most of the grassland was relatively species-poor. There were no species that were new to the county and no rare/ protected species recorded during the survey. Wet grassland accounted for 70.64ha, or 5.75%, of the habitats encountered within the Proposed Project. Of this, only 34.58ha was of local importance (higher value). None of these habitats conformed with Annex I habitat criteria for 'Molinia meadows' (6410).

Habitat Category			Coverage Within Proposed Project		Importance	Distribution
Name	Fossitt Code	Description	ha or m	%		
Wet grassland and cutover bog mosaic	GS4/PB4	Wet or waterlogged areas with peaty soils.	2.96ha	0.24%	Local importance (lower value)	This habitat was recorded on three occasions within the Proposed Project at Chainage TWD – 8200, an area between Chainages TWD – 9800 and TWD – 10300 and a smaller area near Chainage TWD – 23000.
Wet grassland and scrub mosaic	GS4/WS1	Areas of wet or waterlogged soils which are poorly drained with areas of shrub, stunted tree and/or bramble.	0.73ha	0.06%	Local importance (lower value)	This habitat was recorded on four occasions within the Proposed Project. It was recorded between polesets 100B and 101B, between polesets 69B and 70B and near Chainage TWC – 6500 and near Chainage TWC – 6300.
Dense bracken	HD1	Open areas of vegetation dominated by bracken. Other species may be present but the cover of fern must be above 50%.	0.57ha	0.05%	Local importance (lower value)	This habitat was recorded on eight occasions within the Proposed Project; at poleset 76B, TWD – 8600, between TW – 3300 and TW – 3400, between TW – 2500 and TW – 2600 and at TWC – 20300.
Dense bracken and scrub mosaic	HD1/WS1	A mosaic habitat of bracken with shrubs, stunted trees, or brambles.	2.18ha	0.18%	Local importance (lower value)	This habitat was recorded on three occasions within the Proposed Project; near Chainage TW – 2400, between Chainages TWC – 20900 and TWC – 21300 and near Chainage TWC – 20300.
Dense bracken and dry siliceous heath mosaic	HD1/HH1	Open areas of vegetation dominated by bracken with areas of ling heather (<i>Calluna vulgaris</i>), bell heather (<i>Erica cinerea</i>), bilberry (<i>Vaccinium myrtillus</i>) and low-growing western gorse (<i>Ulex gallii</i>).	0.15ha	0.01%	Local importance (lower value)	This habitat was recorded on one occasion in Cushaling, County Offaly near Chainage TWD - 8600.
Wet heath	HH3	Vegetation with at least 25% cover of dwarf shrubs on peaty soils and shallow wet peats.	1.37ha	0.11%	Local importance (higher value)	Areas of wet heath were recorded intermittently throughout the Proposed Project within the townlands of Kilkeaskin, County Kildare from Chainages TWD – 19200 to TWD – 19400 and Derrylahen, County Kildare at Chainage TWD – 26900.
Wet heath and raised bog mosaic	HH3/PB1	A mosaic habitat of heather recolonising on areas of raised bog.	0.11ha	0.01%	County Importance	This habitat was recorded on two occasions in Derrylahen, County Kildare at Chainages TWD – 26700 and TWD – 26600.
Wet heath and cutover bog mosaic	HH3/PB4	A mosaic habitat of heather recolonising on areas of degraded bog.	5.00ha	0.41%	Local importance (higher value)	This extensive area can be found in the townland of Timahoe East, County Kildare near the Chainages of TWD – 21500 to TWD – 22300. This is an area of recolonising cutover bog.
Wet heath and bog woodland mosaic	HH3/WN7	A mosaic habitat of heather with areas of woodland typical of bogs.	4.75ha	0.39%	Local importance (higher value)	This extensive area can be found in the townlands of Kilkeaskin, Loughnacush, Parsonstown and Drehid, County Kildare near the Chainages TWD – 19500 to TWD – 20500. This is an area of recolonising cutover bog.
Raised bog	PB1	Accumulations of acid peat that originated in shallow lake basins or topographic depressions and are at least 3m -12m deep.	1.13ha	0.09%	County Importance	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)’ (Appendix A8.4 Target Habitat Surveys Report). It should be noted, one area at Chainage TWD – 21500 at Timahoe East could only be considered as Annex I quality degraded raised bog if restoration of the hydrology of the entire site, including areas to the north and west, were to be undertaken (Appendix A8.4: Target Habitat Surveys Report).
Cutover bog	PB4	Bog areas where the original mass of peat has been removed via turf extraction. It includes areas where active peat extraction is occurring, as well as degraded bog habitats where past peat cutting has occurred.	29.17ha	2.37%	Cutover bog with potential to provide habitat for marsh fritillary butterfly – local importance (higher value) (2.57ha). The remaining areas of cutover bog are of local importance (lower value).	This habitat was concentrated to the midland regions of the Proposed Project, east of Tullamore, County Offaly and south of Enfield, County Kildare. The cutover bog recorded at Derrymahon, County Kildare was noted as having potential to provide suitable habitat for the marsh fritillary butterfly (Figure 8.77).
Cutover bog and other artificial lakes and ponds mosaic	PB4/FL8	A mosaic habitat of cutover bog containing areas of ponded water due to rewetting.	4.32ha	0.35%	Local importance (higher value)	This habitat was recorded on two occasions in Esker More, County Offaly between Chainages TWC – 23200 and TWC – 23500 and in Ballykilleen and Ballynakill, County Offaly between Chainages TWD 2400 to TWD – 2900. These areas of cutover bog are being rewetted.
Cutover bog and bog woodland mosaic	PB4/WN7	A mosaic of exposed degraded bog with bog woodland recolonising.	57.73ha	4.69%	Local importance (higher value)	An extensive area of this mosaic habitat was recorded in Ticknevin and Kilpatrick, County Kildare from Chainages TWD – 10300 and TWD – 14300. An additional large area was recorded in Cloncant, County Kildare from Chainage TWD – 5000 and TWD – 6100 and between Chainages TWD – 22300 and TWD - 22600 and Chainages TWD – 20600 and TWD - 20900.
Cutover bog and drainage ditches mosaic	PB4/FW4	Cutover bog consisting of a network of drainage ditches.	6.99ha	0.57%	Local importance (lower value)	This habitat was recorded on two occasions in Clonad, County Offaly between Chainage TWC – 12200 and TWC – 12500 and Newtown, County Offaly between Chainages TWC – 20300 and TWC – 21000.
Cutover bog and wet heath mosaic	PB4/HH3	A mosaic habitat of degraded bog with areas recolonising with heather.	1.20ha	0.10%	Local importance (lower value)	This habitat was recorded on one occasion in Timahoe East, County Kildare between Chainages TWD – 23100 and TWD – 23400.
Cutover bog and scrub mosaic	PB4/WS1	A cutover bog which was once used for peat production with areas of scrub recolonising throughout.	11.37ha	0.92%	Local importance (lower value)	This habitat was recorded in Clonad, County Offaly at Chainage TWC – 13200; Island, County Offaly at Chainages TWC – 13500 and TWC – 14000; Rathfeston, County Offaly near Chainage TWC – 11900; Esker More, County Offaly at Chainage TWC – 23200.
Cutover bog, scrub, dry siliceous heath and dry meadows and grassy verges mosaic	PB4/WS1/HH1/GS2	A cutover bog recolonising with scrub, heathland and grass.	0.29ha	0.02%	Local importance (lower value)	This habitat was recorded on one occasion in Timahoe East, County Kildare at Chainage TWD – 23500.

Habitat Category			Coverage Within Proposed Project		Importance	Distribution
Name	Fossitt Code	Description	ha or m	%		
Poor fen and flush	PF2	Poor fen and flush includes peat-forming and non-peat forming fens and flushes that are fed by groundwater or flowing surface waters that are acidic.	0.01ha	0.001%	County importance	Within the Proposed Project, one small area of this habitat, totalling 0.01ha, was identified within one land holding at Derrylahen, County Kildare (Figure 8.95; Chainage TWD – 27400). This habitat was present in a wet depression in a reclaimed peat field. Although poor fen and flush is not listed in Annex I of the Habitats Directive, it is very limited in extent in Ireland and should be regarded as being of conservation importance.
(Mixed) broadleaved woodland	WD1	Woodland habitats with 75-100% cover of broadleaved trees and 0-25% cover of conifers.	11.19ha	0.91%	Local importance (higher value)	Within the Proposed Project, this category was used to describe broadleaved plantation forestry as well as pockets of more naturally occurring woodlands that did not fit in other woodland categories due to their abundance of non-native species.
(Mixed) broadleaved woodland and scrub mosaic	WD1/WS1	A mosaic habitat of broadleaved woodland and areas of shrubs, stunted trees, or brambles.	1.72ha	0.14%	Local importance (higher value)	This habitat was recorded on seven occasions within the Proposed Project at Chainage TWC – 1500, poleset 88B, 9B, 10B, 37B and 38B.
Mixed broadleaved/conifer woodland	WD2	Woodland areas with mixed stands of broadleaved trees and conifers, where both types have a minimum cover of 25% and a maximum cover of 75%.	4.45ha	0.36%	Local importance (higher value)	This habitat was recorded on the eastern bank of Parteen Basin along the northern boundary of the RWI&PS site and lies within the Lower River Shannon SAC (Figure 8.11). It was also recorded infrequently at poleset 64B and 98B, along the access road to the WTP and at the WTP, at RW – 1700 and RW – 2000, TWD – 17200, TWB – 14100, between TWB – 10800 and TWB – 10900 between TWD – 27600 and TWD – 27800, at TWC – 2600, between TWE – 11100 to TWE – 11300, TWE – 2500 and TWE - 3100.
Mixed broadleaved/conifer woodland and scrub mosaic	WD2/WS1	Mixture of both broadleaved and conifer woodland that has isolated patches of scrub throughout.	0.98ha	0.08%	Local importance (higher value)	This habitat was recorded on one occasion in Ballynakill, County Offaly from Chainage TWD – 2200 to TWD - 2400.
(Mixed) conifer woodland	WD3	Woodlands with 75-100% cover of conifer that is not used on a commercial basis.	0.21ha	0.02%	Local importance (higher value)	This habitat was recorded on two occasions within the Proposed Project along the route connecting the BPS to the existing Birr substation and at Chainage TWD – 2200.
Conifer plantation	WD4	Found in areas that support dense stands of planted conifers where the broadleaved component is less than 25% and the overriding interest is commercial timber production.	17.96ha	1.46%	Local importance (lower value)	This habitat was recorded infrequently throughout the Proposed Project. The largest conifer plantation was recorded within the RWI&PS site adjacent to the Lower River Shannon SAC with species consisting of Sitka spruce and Norway spruce (<i>Picea abies</i>).
Hedgerows	WL1	Linear habitats, less than 5m high, dominated by shrubs and sometimes occasional trees.	64,568.32m	37.14%	Local importance (higher value)	These habitats were found throughout the Proposed Project where they frequently delineated field and road boundaries. Common species included hawthorn, ash, blackthorn (<i>Prunus spinosa</i>) and bramble. The hedgerows within the Proposed Project may provide potential nesting habitat for many species of bird.
Hedgerows and stone walls and other stonework mosaic	WL1/BL1	A linear mosaic consisting of a hedgerow with a stone wall beneath.	245.48m	0.14%	Local importance (higher value)	These habitats were recorded on four occasions within the Proposed Project within the powerline west of TWA – 19200, at TWA – 14000, near TWA - 22000 and poleset 82B.
Hedgerows and earth banks mosaic	WL1/BL2	A linear mosaic consisting of a hedgerow with earth banks beneath.	176.49m	0.10%	Local importance (higher value)	This habitat was recorded intermittently throughout the Proposed Project near Chainage TWA – 22700, between poleset 54B and 55B, between poleset 36B and 37B, twice near poleset 29B and near Chainage TWB – 26200.
Hedgerows and dense bracken mosaic	WL1/HD1	A linear mosaic consisting of a hedgerow and dense bracken.	449.01m	0.26%	Local importance (higher value)	This habitat was recorded on five occasions within the Proposed Project south of Chainage RW – 1200, near Chainage TW – 600, near Chainage TW – 8400 and on two occasions at Chainage TW – 8400 and TW – 8500.
Treelines	WL2	A treeline is a narrow row of trees that is greater than 5m in height and typically occurs along field or property boundaries.	42,526.79m	24.46%	Local importance (higher value)	These habitats were found throughout the Proposed Project where they often delineated field and road boundaries. Common species included ash, hawthorn, willow (<i>Salix</i> spp.) and beech. The treelines within the Proposed Project may provide potential nesting habitat for many species of bird and occasionally may also provide roosting habitat for bats.
Treelines and stone walls and other stonework mosaic	WL2/BL1	A linear mosaic consisting of a treeline with a stone wall beneath.	271.20m	0.16%	Local importance (higher value)	This habitat was recorded on four occasions within the Proposed Project at poleset 77B, near Chainage TWA – 24000, Chainage TWA – 18200 and TWA – 18300.
Treelines and earth banks mosaic	WL2/BL2	A linear mosaic consisting of a treeline with earth banks beneath.	720.79m	0.42%	Local importance (higher value)	This habitat was recorded on twelve occasions within the Proposed Project along the 38 kV Uprate Works at poleset 109B, near poleset 80B, at poleset 36B, poleset 9B, poleset 80B, poleset 59B and 60B, twice near Chainage RW – 100, Chainage TW – 13500, Chainage TWB – 5200 and TWB – 5600.
Oak-ash-hazel woodland	WN2	Oak-ash-hazel woodland is described as native, semi-natural woodland that occurs on base-rich or calcareous soils that are generally dry or well-drained, or on rocky limestone terrain.	0.76ha	0.06%	Local importance (higher value)	This habitat was recorded on the eastern bank of Parteen Basin along the northern boundary of the RWI&PS site and lies within the Lower River Shannon SAC (Figure 8.11). It was dominated by pedunculate oak (<i>Quercus robur</i>), ash, or hazel.
Riparian woodland	WN5	This category includes wet woodlands of river margins (gallery woodland) and low islands that are subject to frequent flooding, or where water levels fluctuate as a result of tidal movement in lower reaches of rivers.	0.22ha	0.02%	Local importance (higher value)	Within the Proposed Project this habitat was used to describe gallery woodland along riparian margins.
Wet willow-alder-ash woodland	WN6	This category includes woodlands of permanently waterlogged sites that are dominated by willows, alder or ash, or by various combinations of some or all of these trees.	0.31ha	0.03%	Local importance (higher value)	This habitat was recorded on two occasions within the Proposed Project at Cloghanmore, County Offaly at Chainage TWA – 27600 and along the route connecting the BPS to the existing Birr substation in Killaun, County Offaly. These areas were dominated by alder and grey willow.
Bog woodland	WN7	Woodlands of intact ombrotrophic bogs (i.e. soils or vegetation that receive all of their water and nutrients from precipitation rather than from streams or springs), bog margins and cutover bog.	18.52ha	1.51%	Local importance (higher value)	This habitat was present throughout the Proposed Project in areas of cutover bog and along bog margins. None of the bog woodland habitats recorded conform with the priority Annex I habitat criteria for 'bog woodland (91D0)'.

Habitat Category			Coverage Within Proposed Project		Importance	Distribution
Name	Fossitt Code	Description	ha or m	%		
Bog woodland and scrub mosaic	WN7/WS1	Bog woodland transitioning into scrub.	5.51ha	0.45%	Local importance (higher value)	This habitat was encountered on seven occasions within the Proposed Project in Counties Offaly and Kildare. An area ranging from Chainage TWC – 12700 to TWC – 12900, along the powerline south of Chainage TWC – 13300, at Chainage TWC – 17700, Chainage TWD – 23100, Chainage TWD – 23300, Chainage TWD – 27100 and Chainage TWD – 2900. This habitat consisted of a birch woodland with small amounts of willow and the understorey beginning to dominate with large amounts of bramble and bracken.
Scrub	WS1	Areas that are dominated by at least 50% cover of shrubs, stunted trees, or brambles.	14.91ha / 297.30m	1.21% / 0.17%	Local importance (higher value)	Scrub habitat occurs in patches throughout the Proposed Project where unmanaged areas such as cutover bogs and some agricultural edge habitats have developed a covering of shrubs. Typical species included willows, birch (<i>Betula</i> spp.), ash, hawthorn, blackthorn, bramble, and gorse (<i>Ulex europaeus</i>).
Immature woodland	WS2	Includes habitats that are dominated by sapling trees that have not yet reached threshold heights necessary for inclusion in other categories.	3.03ha	0.25%	Local importance (lower value)	Seven areas, totalling 3.03ha, were noted within the Proposed Project, at polesets 24B, 25B and 26B, between poleset 18B and 19B, along the proposed access road to the WTP, at Chainage TWD – 6500, Chainage TWD – 17100, between Chainage TWD – 13800 and Chainage TWD – 4200.
Short rotation coppice	WS4	Includes areas where frequent coppicing or harvesting of trees and shrubs prevents the development of mature woodland.	0.86ha	0.07%	Local importance (lower value)	This habitat was rarely encountered throughout the Proposed Project. Dominant species within this habitat included ash, bramble, bracken and willow. Although rare, short rotation coppice often provides a high quality of habitat for wildlife.
Recently-felled woodland	WS5	Areas of plantation or other woodland that have been clear-felled but have not been replanted or converted to another land use.	0.02ha	0.002%	Local importance (lower value)	This habitat was rarely encountered throughout the Proposed Project. It was recorded on one occasion at poleset 12B.

8.3.2.1.3.1 Bord na Móna Lands

223. The Proposed Project crosses eight Bord na Móna landholdings in counties Offaly and Kildare. These are: Clonad, Cavemount, Mountlucas, Esker, Cloncreen, Ballydermot, Timahoe South, Timahoe North, and Gilltown (Figure 8.4 to 8.108). The current Bord na Móna land use within the Proposed Project is mainly access, private peat cutting, forestry with some natural revegetation, and former peat production which is undergoing rehabilitation. The Bord na Móna land within the Proposed Project was surveyed during the habitat surveys (Section 8.2.5.1.1) and categorised in accordance with Fossitt (2000) (these habitats are mapped and are shown Figure 8.4 to Figure 8.108 and are included in the descriptions given in Table 8.28):

- The habitats within the Proposed Project in Clonad Bog (c. 11.52ha) were recorded as BL3, FL8, GS2, PB1, PB4, WN7, WN7/WS1 and WS1
- The habitats within the Proposed Project in Cavemount Bog (c. 0.21ha) were recorded as GA1, GS2, GS2/HD1, PB1, PB4 and WS1
- The habitats within the Proposed Project in Mountlucas Bog (26.38ha) were recorded as BC1, BL3, FL8, GA1, GS2, PB4, WS1 and WN7
- The habitats within the Proposed Project in Esker Bog (c. 9.93ha) were recorded as WS1, WN7, HD1, GA1, GS2, GS4, PB4 and PB1
- The habitats within the Proposed Project in Cloncreen Bog (c. 3.41ha) were recorded as WD2/WS1, PB4, WN7 and WS1
- The habitats within the Proposed Project in Ballydermot Bog (also known as Codd, Derrybrennan, and Glashabaun) (c. 63.42ha) were recorded as PB1, PB4, PB4/WS1, GA1, BL3, GS2, GS2/HD1/WS1, GS4, GS4/WS1, FL8, GS4, WD4, WN7, WS1 and WS2
- The habitats within the Proposed Project in Timahoe South Bog (c. 16.14ha) were recorded as BL3, ED3, GS2, HH3, PB1, PB4, WD2, WN7, WS1 and WS2
- The habitats within the Proposed Project in Timahoe North Bog (c. 13.09ha) were recorded as BL3, FL8, GA1, GS4, HH3, PB4, PB4/WS1/HH1/GS2, WN7 and WS1
- The habitats within the Proposed Project in Gilltown Bog (c. 3.22ha) were recorded as BL3, ED3, GS3, GS4, HH3, PB1, PB4, WN7 and WS1.

8.3.2.1.3.2 Rare and/or Protected Habitats

224. No Annex I habitats were recorded within the Proposed Project; however, Annex I habitats were recorded within the study area. Annex I habitats, identified through the desktop study analysis or recorded during habitat surveys, were avoided during the route selection process (Chapter 3: Consideration of Reasonable Alternatives). Repeat surveys were not required at sites subsequently avoided by the Proposed Project.

225. A summary of the Annex I habitats identified within the study area are presented as follows:

- Turlough at Ardcroney, County Tipperary. Habitat surveys carried out in August 2016 classified this site as a priority Annex I habitat, Turloughs [3180] (Appendix A8.4: Target Habitat Surveys Report). The Preferred 200m Pipeline Corridor at the time was subsequently re-routed to avoid this habitat. This site is now located approximately 348m south of the Proposed Project. This habitat is located near Chainage TW – 27600, as shown in Annex A, Figure 14 of Appendix A8.4
- Turlough at Ballythomas, County Tipperary. Habitat surveys carried out in July 2017 classified this site as the priority Annex I habitat, Turloughs [3180] (Appendix A8.4: Target Habitat Surveys Report). A previous iteration of the project was subsequently re-routed to avoid this habitat. The potential extent of the turlough is now located approximately 22m south of the Proposed Project. This habitat is located near Chainage TW – 26000, as shown in Annex A, Figure 14 of Appendix A8.4

- Species-rich *Molinia* grassland with fen affinities was noted at Eminiska, County Tipperary. Habitat surveys carried out in July 2017 and September 2021 classified this site as the Annex I habitat, *Molinia* meadows [6410] (Appendix A8.4: Target Habitat Surveys Report). A previous iteration of the project was subsequently re-routed to avoid this habitat. This habitat is now located approximately 20m north of the Proposed Project and is separated from the Proposed Project by a deep drainage ditch. This habitat is located near Chainage TW – 33100, as shown in Annex A, Figure 16 of Appendix A8.4
- The non-priority Annex I habitat 'Alkaline fens [7230]' area dominated by *Schoenus nigricans* (Schoenus fen) was recorded in Coagh Upper, County Offaly (Appendix A8.3: Site Description of Coagh Upper Fen, County Offaly and Appendix A8.4: Target Habitat Surveys Report). The fen area is located on a break in slope at the base of a steep hill. Water levels in the fen are likely to be maintained by overland surface water runoff and groundwater. The soil under the fen is composed of a thin peat layer with mineral soil with calcareous tufa deposits in some areas. A previous iteration of the project was re-routed to avoid this habitat. This site is located approximately 60m west of the Proposed Project. This habitat is located near Chainage TWB – 1900, as shown in Annex A, Figure 26 of Appendix A8.4
- A small area of the non-priority Annex I habitat 'Transition mire [7140]' was recorded in Coolfin Glebe, County Offaly (Appendix A8.4: Target Habitat Surveys Report). The surface of the site was extremely wet and quaking comprising a floating mat. This habitat was described as a good example of transition mires with typical species assemblage, a high stable water table and no impacting activities. This Annex I habitat is located approximately 78m from the Proposed Project. This habitat is located near Chainage TWB – 7800, as shown in Annex A, Figure 31 of Appendix A8.4
- There was a small area of the non-priority Annex I habitat 'Alkaline Fens [7230]' recorded alongside a small area of the priority habitat 'Petrifying Springs with *Tufa* formation [7220]' in Raheenduff, County Offaly (Appendix A8.4: Target Habitat Surveys Report). These Annex I habitats were located approximately 85m west of the Proposed Project. The spring was located in the east of the site and was surrounded by species comprising a typical *Schoenus* fen community. The fen area was small, however it did correspond to Annex I habitat Alkaline fen. Past drainage had impacted the hydrological integrity of the fen and was likely to have caused a loss of fen habitat. This habitat was located near Chainage TWC – 4300, as shown in Annex A, Figure 38 of Appendix A8.4. However, in 2024, it was confirmed that this area of land has since been heavily modified and as such is no longer considered an Annex I habitat. This area now consists of a mosaic habitat of wet grassland and spoil and bare ground.
- The priority Annex I habitat 'Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210]' and the non-priority Annex I habitat 'Alkaline fens [7230]' were recorded in Derrinclare Cutover, County Offaly (Appendix A8.4: Target Habitat Surveys Report). A previous iteration of the project was re-routed to avoid this habitat. These sites are located approximately 220m south-east of the Proposed Project. This habitat is located near Chainage TWA – 5500, as shown in Annex A, Figure 19 of Appendix A8.4
- A small area of the priority Annex I habitat 'Active raised bogs [7110]' was recorded at Island Bog, County Offaly (Appendix A8.4: Target Habitat Surveys Report). This area of active raised bog is approximately 212m from the Proposed Project, separated by a local access road. The bog remnant grades from scrub/marginal bog ecotope along the road, to active peat forming towards the centre of the remnant site. No intact peat occurs to the south of the access road. This habitat is located near Chainage TWC – 13600, as shown in Annex A, Figure 40 of Appendix A8.4
- A small area of the priority Annex I habitat 'Active raised bogs [7110]' was recorded at Drumachon Bog, County Kildare (Appendix A8.4: Target Habitat Surveys Report). This area of active raised bog is located approximately 76m from the Proposed Project at its closest point and is separated by a wooded access track. The bog remnant grades from willow/birch scrub/marginal bog ecotope along the road to active peat forming towards the centre of the remnant site. No intact peat occurs to the east of the access road. This habitat is located near Chainage TWD – 21700, as shown in Annex A Figure 50 of Appendix A8.4.

226. The potential for these habitats to occur within the Zol of the Proposed Project, in particular the sensitive surface water and groundwater dependent habitats, is considered in Section 8.3.6.

8.3.2.1.3.3 Rare and/or Protected Flora

227. Rare plant surveys were undertaken in August 2022, May and June 2023, and August 2024 to check for the occurrence of rare and/or protected flora species within the Proposed Project. In total, 53 areas along the Proposed Project were identified as having potential habitat for rare and/or protected flora. During the 2022 surveys, two populations of *Clinopodium acinos* were identified growing on exposed, sparsely vegetated mineral soils at Mount Lucas Wind Farm, County Offaly and Ticknevin, County Kildare. During 2023 surveys, two further populations of *Clinopodium acinos* were identified in Cushaling County Kildare/Offaly border and on the western margin of Mount Lucas Wind Farm. As previously mentioned, this species is no longer listed as protected on the 2022 Flora Protection Order, likely associated with recent information regarding its wider distribution in Ireland. In 2024, two areas of woodland in County Offaly, within and adjoining the Proposed Project, were checked for the possible occurrence of *Pyrola minor*; however, no signs of this species were recorded at either site (Appendix A8.5: Rare Plants Survey Report). No other rare and/or protected flora species were recorded during these surveys.
228. During multidisciplinary walkover surveys one rare and/or protected flora species was confirmed as being present within the Proposed Project: the Red Listed species, yellow archangel (*Lamium galeobdolon subsp. montanum*).
229. Rare and/or protected flora species recorded within the Proposed Project study area during surveys between 2016 and 2024 are presented in Table 8.29 and shown in Figure 8.4 to Figure 8.108.

Table 8.29: Records of Rare and/or Protected Flora Within the Study Area of the Proposed Project

Chainage / Location	Species Name	Designation	Distance from Proposed Project (m)
TW – 34100	Yellow archangel (<i>Lamium galeobdolon subsp. montanum</i>)	Red Listed Species.	0
TWC – 13600	Basil thyme (<i>Clinopodium acinos</i>)	Formerly protected under Flora Protection Order 2015; Red Listed Species.	147
TWC – 17200	Basil thyme (<i>Clinopodium acinos</i>)	Formerly protected under Flora Protection Order 2015; Red Listed Species.	0
TWD – 10300	Basil thyme (<i>Clinopodium acinos</i>)	Formerly protected under Flora Protection Order 2015; Red Listed Species.	0
TWD – 12700	Basil thyme (<i>Clinopodium acinos</i>)	Formerly protected under Flora Protection Order 2015; Red Listed Species.	0
TWD – 12800	Basil thyme (<i>Clinopodium acinos</i>)	Formerly protected under Flora Protection Order 2015; Red Listed Species.	21
TWD – 12800	Basil thyme (<i>Clinopodium acinos</i>)	Formerly protected under Flora Protection Order 2015; Red Listed Species.	35
TWD – 12800	Basil thyme (<i>Clinopodium acinos</i>)	Formerly protected under Flora Protection Order 2015; Red Listed Species.	79
TWD – 12900	Basil thyme (<i>Clinopodium acinos</i>)	Formerly protected under Flora Protection Order 2015; Red Listed Species.	114
TWD – 12900	Basil thyme (<i>Clinopodium acinos</i>)	Formerly protected under Flora Protection Order 2015; Red Listed Species.	146
TWD – 12900	Basil thyme (<i>Clinopodium acinos</i>)	Formerly protected under Flora Protection Order 2015; Red Listed Species.	153
TWD – 12900	Basil thyme (<i>Clinopodium acinos</i>)	Formerly protected under Flora Protection Order 2015; Red Listed Species.	201

Chainage / Location	Species Name	Designation	Distance from Proposed Project (m)
TWD – 12900	Basil thyme (<i>Clinopodium acinos</i>)	Formerly protected under Flora Protection Order 2015; Red Listed Species.	207
TWD – 13000	Basil thyme (<i>Clinopodium acinos</i>)	Formerly protected under Flora Protection Order 2015; Red Listed Species.	233
TWD – 13000	Basil thyme (<i>Clinopodium acinos</i>)	Formerly protected under Flora Protection Order 2015; Red Listed Species.	252
TWD – 13000	Basil thyme (<i>Clinopodium acinos</i>)	Formerly protected under Flora Protection Order 2015; Red Listed Species.	295

8.3.2.1.3.4 Invasive Non-Native Species

230. Invasive non-native species recorded within the Proposed Project study area during ecological field surveys from 2016 to 2025 are presented in Table 8.30 and shown in Figure 8.4 to Figure 8.108.
231. In total, 14 INNS were recorded at 70 locations within the study area of the Proposed Project, which included: rhododendron, Japanese knotweed, montbretia (*Crocasmia × crocosmiiflora*), Himalayan knotweed, butterfly bush (*Buddleja davidii*), cherry laurel, snowberry (*Symphoricarpos albus*), giant rhubarb (*Gunnera tinctoria*), wall cotoneaster, common milkweed (*Asclepias syriaca*), traveller's-joy (*Clematis vitalba*), winter heliotrope (*Petasites pyrenaicus*), 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. No. 477/2011) (as amended).
232. Rhododendron was recorded on two occasions within the Proposed Project, near poleset 79B and 99B. Rhododendron was recorded on four occasions 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.
233. 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 (Table 8.30). Outside of the Proposed Project, larger areas of Japanese knotweed were identified near the Kilmaistulla River at Chainage TW – 700 where a 10m² area of Japanese knotweed was recorded. A 30m² area of Japanese knotweed was recorded near Chainage TW – 1100 and a 25m² area of Japanese knotweed was recorded between Chainages TW – 2200 and TW – 2300. A 10m² area of Japanese knotweed was recorded along the R445.
234. 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.
235. Giant rhubarb was recorded on one occasion approximately 14m from the RWI&PS, closest to Chainage RW – 1.
236. Giant hogweed was recorded on one occasion within the Proposed Project near Chainage TW – 1900 and within the 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.

237. 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 120m² was found (Table 8.30).

Table 8.30: Records of Invasive Non-Native Species Within the Study Area of the Proposed Project

Chainage / Approximate Location	Species Name	Designation	Distance from Proposed Project (m)
Poleset 19B	Rhododendron (<i>Rhododendron ponticum</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	27
Poleset 79B	Rhododendron (<i>Rhododendron ponticum</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	0
Poleset 79B	Rhododendron (<i>Rhododendron ponticum</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	2
Poleset 89B	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	11
Poleset 89B	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	14
Poleset 99B	Rhododendron (<i>Rhododendron ponticum</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	0
Poleset 99B	Rhododendron (<i>Rhododendron ponticum</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	50
Access road (R445) to 38 kV Uprate Works	Wall cotoneaster (<i>Cotoneaster horizontalis</i>)	Medium Impact Invasive Species	28
Access road (R445) to 38 kV Uprate Works	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	0
Access road (R445) to 38 kV Uprate Works	Himalayan knotweed (<i>Persicaria wallichii</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	>1
Access road (R445) to 38 kV Uprate Works	Montbretia (<i>Crocsmia × crocosmiiflora</i>)	Invasive Species Ireland Risk Assessment – 'Amber List: Recorded species' (Invasive Species Ireland n.d.) and also listed as a 'Non-native invasive species' by TII – 'The Management of Invasive Alien Plant Species on National Roads – Technical Guidance' (TII 2020a).	0
Access road (R445) to 38 kV Uprate Works	Butterfly-bush (<i>Buddleja davidii</i>)	Medium Impact Invasive Species	1.4
Access road (R445) to 38 kV Uprate Works	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	2.8
Access road (R494) to RWI&PS	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	0
RWI&PS site / RW – 1	Giant-rhubarb (<i>Gunnera tinctoria</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	36
TW – 700	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	0
TW – 700	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	0
TW – 700	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	22
TW – 900	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	74
TW – 900	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	58

Chainage / Approximate Location	Species Name	Designation	Distance from Proposed Project (m)
TW – 1000	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	24
TW – 1000	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	2
TW – 1000	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	>1
TW – 1100	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	4
TW – 1100	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	2
TW – 1100	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	10
TW – 1200	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	5
TW – 1200	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	6
TW – 1600	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	38
TW – 1600	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	39
TW – 1600	Giant hogweed (<i>Heracleum mantegazzianum</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	27
TW – 1700	Giant hogweed (<i>Heracleum mantegazzianum</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	13
TW – 1900	Giant hogweed (<i>Heracleum mantegazzianum</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	0
TW – 2000	Giant hogweed (<i>Heracleum mantegazzianum</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	4
TW – 2300	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	0
TW – 2300	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	54
TW – 2500	Common milkweed (<i>Asclepias syriaca</i>)	Regulated invasive species of Union concern under the European Regulation on the prevention and management of the introduction and spread of invasive alien species [1143/2014].	27
TW – 2500	Himalayan knotweed (<i>Persicaria wallichii</i>)	Medium Impact Invasive Species; Regulation S.I. 477 (Ireland)	23
TW – 2600	Himalayan knotweed (<i>Persicaria wallichii</i>)	Medium Impact Invasive Species; Regulation S.I. 477 (Ireland)	45
TW – 3400	Butterfly-bush (<i>Buddleja davidii</i>)	Medium Impact Invasive Species	0
TW – 3400	Butterfly-bush (<i>Buddleja davidii</i>)	Medium Impact Invasive Species	0
TW – 3400	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	2
TW – 5300	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	38

Chainage / Approximate Location	Species Name	Designation	Distance from Proposed Project (m)
TW – 5300	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	26
TW – 7000	Butterfly-bush (<i>Buddleja davidii</i>)	Medium Impact Invasive Species	55
TW – 7000	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	51
TW – 31400	Snowberry (<i>Symphoricarpos albus</i>)	Invasive Species Ireland Risk Assessment – 'Amber List: Recorded species' (Invasive Species Ireland n.d.)	22
TWA – 9400	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	48
TWA – 9500	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	40
TWA – 26300	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	56
TWA – 26500	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	55
Road leading to Birr substation	Snowberry (<i>Symphoricarpos albus</i>)	Invasive Species Ireland Risk Assessment – 'Amber List: Recorded species' (Invasive Species Ireland n.d.)	4
Road leading to Birr substation	Cherry laurel (<i>Prunus laurocerasus</i>)	High Impact Invasive Species	0
Road leading to Birr substation	Wall cotoneaster (<i>Cotoneaster horizontalis</i>)	Medium Impact Invasive Species	3
Road leading to Birr substation	Snowberry (<i>Symphoricarpos albus</i>)	Invasive Species Ireland Risk Assessment – 'Amber List: Recorded species' (Invasive Species Ireland n.d.)	0
Road leading to Birr substation	Cherry laurel (<i>Prunus laurocerasus</i>)	High Impact Invasive Species	3
Road leading to Birr substation	Snowberry (<i>Symphoricarpos albus</i>)	Invasive Species Ireland Risk Assessment – 'Amber List: Recorded species' (Invasive Species Ireland n.d.)	0
Road leading to Birr substation	Snowberry (<i>Symphoricarpos albus</i>)	Invasive Species Ireland Risk Assessment – 'Amber List: Recorded species' (Invasive Species Ireland n.d.)	>1
Road leading to Birr substation	Snowberry (<i>Symphoricarpos albus</i>)	Invasive Species Ireland Risk Assessment – 'Amber List: Recorded species' (Invasive Species Ireland n.d.)	0
Road leading to Birr substation	Snowberry (<i>Symphoricarpos albus</i>)	Invasive Species Ireland Risk Assessment – 'Amber List: Recorded species' (Invasive Species Ireland n.d.)	0
Road leading to Birr substation	Snowberry (<i>Symphoricarpos albus</i>)	Invasive Species Ireland Risk Assessment – 'Amber List: Recorded species' (Invasive Species Ireland n.d.)	6
Road leading to Birr substation	Traveller's-joy (<i>Clematis vitalba</i>)	Medium Impact Invasive Species	41
Road leading to Birr substation	Wall cotoneaster (<i>Cotoneaster horizontalis</i>)	Medium Impact Invasive Species	0
Road leading to Birr substation	Snowberry (<i>Symphoricarpos albus</i>)	Invasive Species Ireland Risk Assessment – 'Amber List: Recorded species' (Invasive Species Ireland n.d.)	60

Chainage / Approximate Location	Species Name	Designation	Distance from Proposed Project (m)
TWB – 24800	Montbretia (<i>Crocsmia × crocosmiiflora</i>)	Invasive Species Ireland Risk Assessment – ‘Amber List: Recorded species’ (Invasive Species Ireland n.d.) and also listed as a ‘Non-native invasive species’ by TII – ‘The Management of Invasive Alien Plant Species on National Roads – Technical Guidance’ (TII 2020a).	18
TWC – 21500	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	0
TWC – 22100	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	75
TWC – 22200	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	6
TWC – 23800	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	46
TWD – 3200	Butterfly-bush (<i>Buddleja davidii</i>)	Medium Impact Invasive Species	60
TWD – 2500	Winter heliotrope (<i>Petasites pyrenaicus</i>)	Low Impact Invasive Species	0
TWD – 2500	Winter heliotrope (<i>Petasites pyrenaicus</i>)	Low Impact Invasive Species	0
TWD – 3500	Butterfly-bush (<i>Buddleja davidii</i>)	Medium Impact Invasive Species	0
TWD – 3500	Butterfly-bush (<i>Buddleja davidii</i>)	Medium Impact Invasive Species	2
TWD – 27800	Butterfly-bush (<i>Buddleja davidii</i>)	Medium Impact Invasive Species	49
TWD – 28800	Butterfly-bush (<i>Buddleja davidii</i>)	Medium Impact Invasive Species	6
TWD – 30700	Butterfly-bush (<i>Buddleja davidii</i>)	Medium Impact Invasive Species	10
TWD – 31900	Butterfly-bush (<i>Buddleja davidii</i>)	Medium Impact Invasive Species	1
TWE – 7700	Japanese knotweed (<i>Reynoutria japonica</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	15
TWE – 9700	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	0
TWE – 9700	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	0
TWE – 9700	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	1
TWE – 9800	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	0
TWE – 9800	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	0
TWE – 9800	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	0
TWE – 9800	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	10
TWE – 9800	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	69
TWE – 9800	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	28
TWE – 9900	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	40

Chainage / Approximate Location	Species Name	Designation	Distance from Proposed Project (m)
TWE – 10000	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	67
TWE – 11100	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	0
TWE – 11100	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	0
TWE – 11100	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	0
TWE – 11100	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	7
TWE – 11200	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	0
TWE – 11300	Himalayan balsam (<i>Impatiens glandulifera</i>)	High Impact Invasive Species; Regulation S.I. 477 (Ireland)	1

8.3.2.2 Mammals – Bats

8.3.2.2.1 Bats – Desktop Review Results

238. A review of existing records of bat species within a 10km study area of the Proposed Project revealed that eight of the nine species of bat found in Ireland have been recorded within this study area. These include common and soprano pipistrelles (*Pipistrellus pipistrellus* and *Pipistrellus pygmaeus* respectively), Leisler's bat, Daubenton's bat (*Myotis daubentonii*), Natterer's bat, Whiskered bat (*M. Mystacinus*) and brown long-eared bat, as listed in Table 8.31. A total of 2,001 geo-referenced bat records were available for the 10km search area. The number of records for each of the bat species is listed in Table 8.31 and this includes 87 roosts (some with multiple species recorded) and 1,914 bat detector records (some locations with multiple species recorded). The common pipistrelle was the most frequently recorded bat species followed by soprano pipistrelle. There are seven roost records within 1km of the Proposed Project, three of which are important maternity colonies for whiskered bats, soprano pipistrelles and Leisler's bats, all located in vicinity of Birr, County Offaly and between 500m to 1km from the Proposed Project.

239. There were no records of lesser horseshoe bat (*Rhinolophus hipposideros*) present within the 10km study area. The distribution range of lesser horseshoe bats is mainly confined to the west of Ireland in Counties Cork, Kerry, Limerick, Clare, Galway and Mayo.

Table 8.31: Online Bat Records Within a 10km Study Area of the Proposed Project

Common Name	Scientific Name	Within 10km Study Area	Known roosts	Source
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	✓	16	BCIreland data
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	✓	23	BCIreland data
Nathusius' pipistrelle	<i>Pipistrellus nathusii</i>	✓	None	BCIreland data
Leisler's bat	<i>Nyctalus leisleri</i>	✓	23	BCIreland data
Brown long-eared Bat	<i>Plecotus auritus</i>	✓	33	BCIreland data
Daubenton's bat	<i>Myotis daubentonii</i>	✓	6	BCIreland data
Whiskered bat	<i>Myotis mystacinus</i>	✓	3	BCIreland data
Natterer's bat	<i>Myotis nattereri</i>	✓	8	BCIreland data
Lesser horseshoe bat	<i>Rhinolophus hipposideros</i>	None recorded	None	NPWS/BCIreland data

8.3.2.2.2 Bats – Field Survey Results

8.3.2.2.2.1 Daytime Inspection Results

240. During the survey periods for June, July, August and September 2019, buildings recorded in or within 75m of previous iterations of the project were inspected during the daytime. A total of 35 buildings were inspected, one of which was located within the Proposed Project (Building No. 1) while the remainder were within 75m of previous iterations of the project. Building No. 1 was considered to be of high suitability for roosts. The remaining 34 buildings ranged from negligible to high suitability for roosts. The results of the building/structure surveys undertaken in 2019 are listed in Table 6a to Table 6d in Appendix A8.9 (Bat Surveys Report).

241. During the survey periods for July, August and September 2020, two buildings (Building 1 and Building 34) were surveyed. Building 1 was surveyed in 2019 but due to the fact it would be directly impacted by the Proposed Project, it was surveyed again in 2020. Building 34 was also surveyed in 2019. This building is located outside the boundary of the Proposed Project, but due to unclear results in 2019, it was

deemed necessary to re-survey in 2020. Both buildings were found to be of high suitability for bats. The results of the building/structure surveys undertaken in 2020 are listed in Table 6e in Appendix A8.9 (Bat Surveys Report).

242. During the survey periods for June, July and August 2021, six buildings were surveyed. The buildings were found to range from being of low to moderate suitability with no evidence of bats recorded. The results of the building/structure survey undertaken in 2021 are listed in Table 6f in Appendix A8.9 (Bat Surveys Report).
243. During the survey periods for July and August 2024, 10 buildings were surveyed. The results presented in Table 6g in Appendix A8.9 (Bat Surveys Report) are daytime inspection survey results only along with details of other surveys completed.
244. During the survey periods for May and June 2025, one building was surveyed. The results presented in Table 6h in Appendix A8.9 (Bat Surveys Report) are daytime inspection survey results only along with details of other surveys completed.

8.3.2.2.2 Tree Survey Results

245. Daytime inspection of mature trees located within the study area were undertaken over the course of the survey seasons in 2020 and 2021. Trees deemed suitable as PBRs in 2020 were identified at the following locations:

- RWI&PS
- WTP
- BPT
- T19 Bat Target Area
- Watercourses
 - Kilmastulla Bridge (Kilmastulla River)
 - River Liffey crossing point
 - Silver River crossing point
 - Camcor River tributary crossing point
 - Little Brosna River crossing point
 - Nenagh River crossing point.

246. No trees identified as PBRs were recorded at the following watercourses:

- Grand Canal crossing points
- Figile River crossing point
- Camcor River crossing point.

247. Trees deemed suitable as PBRs in 2021 were identified at the following locations:

- Bat Target Areas
- Additional areas surveyed in County Offaly.

248. No trees identified as PBRs were recorded at the following locations:

- Additional areas surveyed in County Tipperary
- Termination Point Reservoir at Peamount, County Dublin

- Bat Target Areas 21, 22, 23, 24, 26.

249. In 2025, where access was permitted, PBR trees were resurveyed by dusk survey and static surveillance.
250. Data collated were mapped and queried in relation to the Proposed Project. In summary, trees (individual trees, six treelines, and one cluster) were identified as having a PBR within the Proposed Project. The tree PBR values ranged from category 1 to category 3 (Table 8.9) and contained potential roost features such as heavy ivy growth, tree holes, and dead wood. The location of these tree PBRs along the route of the Proposed Project are shown on Figure 3a in Appendix A8.9 (Bat Surveys Report).

8.3.2.2.2.3 Dusk and Dawn Bat Survey Results

251. Dusk and dawn bat surveys were completed in June, July, August and September 2019. Surveys were not undertaken in October 2019 due to poor weather conditions; therefore, the areas required to be surveyed in October 2019 were instead surveyed in June 2021. Between June and September 2019, a total of 29 buildings were surveyed by dusk or dawn surveys. A total of 14 roosts were confirmed during the surveys.
252. Dusk bat surveys were completed in July, August and September of 2020. Surveys were not undertaken in June 2020 due to COVID-19 restrictions, but the areas planned for that month were instead surveyed in June 2021. Surveying was not planned for October 2020 due to poor weather conditions that generally occur during this month. Between June and September 2020, two buildings, one bridge and a tree were surveyed by dusk bat surveys. One building roost and one tree roost were confirmed. An additional building was identified as a roost during the dusk emergence survey of Kilmastulla Bridge.
253. Dusk bat surveys were completed in June, July and August of 2021. Six buildings were surveyed by dusk bat surveys. Two roosts were confirmed.
254. Dusk and dawn bat surveys were completed in June 2022 where one building was surveyed by a dawn bat survey and no roosts were confirmed. The woodland area in Parteen was also surveyed by dusk and dawn survey and no roosts were confirmed.
255. Dusk bat surveys of buildings were completed in July and August 2024. In May 2024, one tree previously recorded as a bat roost was re-surveyed. In July and August 2024, nine buildings were surveyed by dusk bat surveys. Eight buildings and one tree were confirmed as roosts.
256. Dusk bat surveys of trees identified as PBRs and one building were completed in May and June 2025. In total, 22 PBR locations were surveyed.
257. In total, 51 buildings (or sets of buildings) were inspected and/or surveyed between 2019 and 2025. Twenty-six of these buildings were recorded as bat roosts for the following bat species: common pipistrelle (n=15 roosts), Natterer's bat (n=9 roosts), lesser horseshoe bat (n=1 roost), soprano pipistrelle (n=6 roosts), brown long-eared bat (n=6 roosts), whiskered bat (n=2 roosts) and Leisler's bat (n=4 roosts). Table 8.32 presents a list of all the buildings surveyed along with additional information including survey year and location in relation to the Proposed Project. Six tree roosts were also confirmed for soprano pipistrelles, Leisler's bat and Daubenton's bats, two located in Parteen Woodland and one in County Offaly. The soprano pipistrelle tree roost is not located within the boundary of the Proposed Project. As a result of the 2025 surveys of PBR trees, bat roosts (Natterer's bat roost and two trees recorded as bat roosts for soprano pipistrelle and common pipistrelle) were confirmed at two PBR locations. More detailed information is provided in Appendix A8.9 (Bat Surveys Report).

Table 8.32: Bat Roosts Results

Building Number (No. of Buildings)	Value	2019	2020	2021	2022	2024	2025	Roost	Bat Species	Roost Type	Location (Distance from Proposed Project)
Building 1	High	Dusk survey	Two dusk surveys	—	One dawn survey	—	Two dusk surveys	Yes	Lesser horseshoe bat, brown long-eared bat, Natterer's bat	Night Roost (lesser horseshoe bat) and daytime roosts (brown long-eared bat and Natterer's bat)	Within
Building 2 (x2)	Moderate to High	Dusk survey	—	—	—	—	—	No	—	—	90m
Building 2a	High	—	Dusk survey	—	—	—	—	Yes	Common pipistrelle	Satellite Roost	125m
Building 3 (x3)	Low, Moderate, High	Dusk survey	—	—	—	—	—	Yes	Common pipistrelle, Natterer's bat	Potential Maternity Roost (common pipistrelle), Daytime Roost (Natterer's bat)	40m
Building 4	Negligible	—	—	—	—	—	—	No	—	—	70m
Building 5	Low	Dawn survey	—	—	—	—	—	No	—	—	90m
Building 6	Negligible	—	—	—	—	—	—	No	—	—	36m
Building 7 (x4)	Low, Moderate, High	Dusk survey	—	—	—	—	—	Yes	Common pipistrelle	Night Roost	73m
Building 8 (x2)	Moderate, High	Dusk survey	—	—	—	—	—	No	—	—	109m
Building 9	High	Dusk survey	—	—	—	—	—	No	—	—	33m
Building 10 (x5)	Low, Moderate to High	Dusk survey	—	—	—	—	—	No	—	—	326m
Building 11	High	Dusk survey	—	—	—	—	—	Yes	Brown long-eared bat	Maternity Roost	15m
Building 12 (x3)	Low, Moderate	Dusk survey	—	—	—	Dusk Survey	—	Yes	Common pipistrelle, Whiskered bat	Satellite Roost (both species) Day Roost (common pipistrelle)	31m
Building 13	Negligible	—	—	—	—	—	—	No	—	—	100m
Building 14 (x2)	Low, Moderate	Dusk survey	—	—	—	—	—	Yes	Natterer's bat	Night Roost	100m
Building 15	Negligible	—	—	—	—	—	—	No	—	—	37m

Building Number (No. of Buildings)	Value	2019	2020	2021	2022	2024	2025	Roost	Bat Species	Roost Type	Location (Distance from Proposed Project)
Building 16	Low	Dusk survey	—	—	—	—	—	No	—	—	44m
Building 17	Moderate	Dusk survey	—	—	—	—	—	No	—	—	105m
Building 18 (x4)	Low, Low to Moderate	Dusk survey	—	—	—	—	—	Yes	Natterer's bat, brown long-eared bat, common pipistrelle	Feeding Roost (Natterer's bat), Night Roost (brown long-eared bat and common pipistrelle)	35m
Building 19 (x5)	Negligible, Low, Moderate	Dusk survey	—	—	—	Dusk Survey	—	Yes	Natterer's bat, common pipistrelle, soprano pipistrelle	Satellite Roost (Natterer's bat, common pipistrelle) Day Roost (soprano pipistrelle)	100m
Building 20	Negligible	—	—	—	—	—	—	No	—	—	40m
Building 21 (x3)	Negligible, Low to Moderate	Dusk survey	—	—	—	—	—	Yes	Pipistrellus spp.	Night Roost	85m
Building 22 (x2)	Moderate, High	Dusk survey	—	—	—	—	—	Yes	Common pipistrelle	Satellite Roost	100m
Building 23 (x3)	Low, Moderate, Moderate to High	Dusk survey	—	—	—	—	—	Yes	Common pipistrelle	Night Roost	53m
Building 24 (x4)	Low, Moderate	Dusk survey	—	—	—	—	—	—	—	—	60m
Building 25 (x4)	Low, High	Dusk survey	—	—	—	—	—	Yes	Soprano pipistrelle	Satellite Roost	125m
Building 26 (x4)	Low, Moderate to High	Dusk survey	—	—	—	—	—	Yes	Soprano pipistrelle, Natterer's bat	Maternity Roost (soprano pipistrelles) and Satellite Roost (Natterer's bat)	127m
Building 27	Negligible	—	—	—	—	—	—	—	—	—	60m
Building 28	High	Dawn survey	—	—	—	—	—	Yes	Natterer's bat, brown long-eared bat, soprano pipistrelle	Unknown, likely to be maternity and Satellite Roosts present for all bat species recorded.	255m
Building 29	Low	Dusk survey	—	—	—	—	—	No	—	—	282m
Building 30	Negligible	Dusk survey	—	—	—	—	—	No	—	—	335m

Building Number (No. of Buildings)	Value	2019	2020	2021	2022	2024	2025	Roost	Bat Species	Roost Type	Location (Distance from Proposed Project)
Building 31 (x2)	Negligible, Low to Moderate	Dusk survey	—	—	—	—	—	No	—	—	113m
Building 32 (x2)	Low, Moderate to High	Dusk survey	—	—	—	—	—	Yes	Common pipistrelle, Whiskered bat, brown long-eared bat	Night Roost (whiskered bat and brown long-eared bat). Maternity Roost (common pipistrelle) in adjacent building.	10m
Building 33	Low	Dusk survey	—	—	—	—	—	No	—	—	68m
Building 34	High	Dusk survey	Dusk survey	—	—	—	—	No	—	—	43m
Building 35 (x2)	Negligible, Moderate	Dusk survey	—	—	—	—	—	Yes	Common pipistrelle	Satellite Roost	25m
Building 36	Low	—	—	Dusk survey	—	—	—	Yes	Common pipistrelle	Satellite Roost	135m
Building 37	Low to Moderate	—	—	Dusk survey	—	—	—	No	—	—	126m
Building 38	Low to Moderate	—	—	Dusk survey	—	—	—	No	—	—	180m
Building 39	Moderate	—	—	Dusk survey	—	—	—	Yes	Leisler's bat	Satellite Roost	254m
Building 40	Moderate	—	—	Dusk survey	—	—	—	No	—	—	124m
Building 41	Negligible	—	—	Dusk survey	—	—	—	No	—	—	0m
Building 42	Not specified (surveyed by TOBIN)	—	—	Dusk survey	—	—	—	Yes	Leisler's bat	Roost type not specified by TOBIN	15m

Building Number (No. of Buildings)	Value	2019	2020	2021	2022	2024	2025	Roost	Bat Species	Roost Type	Location (Distance from Proposed Project)
Building 44 (>5)	Negligible, Moderate, High	—	—	—	—	Dusk survey	—	Yes	Natterer's bat, common pipistrelle, soprano pipistrelle, brown long-eared bat	Satellite Roosts (Natterer's bat, common pipistrelle, brown long-eared bat) Day Roosts (Natterer's bat, common pipistrelle, soprano pipistrelle, brown long-eared bat)	120m
Building 45 (x5)	Negligible, Low, Moderate	—	—	—	—	Dusk survey	—	Yes	Soprano pipistrelle, Leisler's bat	Satellite Roost (soprano pipistrelle) Day Roost (Leisler's bat)	228m
Building 46	Low	—	—	—	—	Dusk survey	—	No	—	—	158m
Building 47	Moderate	—	—	—	—	Dusk survey	—	Yes	Leisler's bat	Satellite Roost	Within
Building 48 (x2)	Negligible, Moderate	—	—	—	—	Dusk survey	—	Yes	Common pipistrelle	Satellite Roost	73m
Building 49 (x2)	Negligible, Moderate	—	—	—	—	Dusk survey	—	Yes	Common pipistrelle	Satellite Roost	186m
Building 50	Negligible	—	—	—	—	Daytime inspection only	—	No	—	—	158m
Building 51 (x2)	Low, Moderate	—	—	—	—	Dusk survey	—	Yes	Common pipistrelle, Natterer's bat	Maternity Roost (Common pipistrelle) Day Roost (Natterer's bat)	142m

8.3.2.2.4 Walking Transects Results

258. Between June and October 2019, a total of 23 walking transects were surveyed along the Proposed Project between County Tipperary and County Kildare, post dusk surveys. Habitats surveyed included improved grasslands, watercourses, hedgerows, treelines, scrub and woodlands. Bat species recorded included common pipistrelle, soprano pipistrelle, Leisler's bat, brown long-eared bat, and *Myotis* spp. Detailed results of the walking transects are listed in Table 8b to Table 8h in Appendix A8.9 (Bat Surveys Report).
259. Walking transects (seven in total) were also undertaken post dusk surveys in July, August and September of 2020. Areas surveyed included Parteen Basin, the RWI&PS, WTP, and BPT, and Kilmastulla Bridge. A total of 859 bats (nine different species) were collated during the 2020 walking transects. Detailed results of the walking transects undertaken in 2020 are summarised in Table 11b and Table 11c in Appendix A8.9 (Bat Surveys Report).
260. Seven walking transects, undertaken post dusk surveys, were carried out in June, July, and August of 2021 along the Proposed Project in County Tipperary, County Offaly, and County Kildare, and at the TPR. A total of 851 bats (nine different species) were collated during the 2021 walking transects. Detailed results of the walking transects undertaken in 2021 are summarised in Table 12d and Table 12e in Appendix A8.9 (Bat Surveys Report).
261. Two walking transects were surveyed in June 2022, post dusk surveys, in areas along the Proposed Project in County Offaly. The species recorded were common pipistrelle, soprano pipistrelle, and Leisler's bat. Detailed results of the walking transects undertaken in 2022 are summarised in Table 13d in Appendix A8.9 (Bat Surveys Report).

8.3.2.2.5 Driving Transects Results

262. Driving transects were undertaken in May, June, and July 2019. The length of the Proposed Project was examined and fourteen driving transects were designed along the road network within and adjacent to the Proposed Project. The location of the transects is presented in Figure 2b in Appendix A8.9 (Bat Surveys Report).
263. Along the route of the pipeline, six species of bat were recorded during the driving transects: common pipistrelle, soprano pipistrelle, Leisler's bat, brown long-eared bat, Nathusius' pipistrelle and *Myotis* spp. The common pipistrelle was the most frequently recorded bat species. The number of bat passes/hr and the number of bat passes/km were also calculated. This provides a means to compare the level of bat activity for each bat species along the transect routes. Driving transect 3 had a higher level of common pipistrelle bat passes/km (Ballagh Wood, County Kildare), driving transect 4 had the highest level of soprano pipistrelle bat passes/km (Springvalley, County Kildare) and driving transect 1 had the highest level of Leisler's bat passes/km (Peamount, County Dublin).
264. Along the 38 kV Uprate Works, two bat species (common and soprano pipistrelle) were recorded in June, while four bat species (common and soprano pipistrelle, Leisler's bat and *Myotis* species) were recorded in July. Soprano pipistrelles was the most frequently encountered bat species.
265. A summary of bat encounters during the driving transects is provided in Table 9b in Appendix A8.9 (Bat Surveys Report).

8.3.2.2.6 Passive Static Bat Detector Results

266. Passive static recording units were distributed along the route of the Proposed Project to coincide with building surveys and walking transects. The static unit locations were selected by the bat specialist to represent the principal habitat feature present within the bat target areas e.g. treeline, hedgerow.
267. Static detectors were deployed by TOBIN at 12 separate sites between 2016 and 2018:
- In 2016, statics were deployed at Parteen Basin, Knockadromin, Newtownmoneenluggagh, Killeenlea, Kilmastulla (two locations), Ashley Park (three locations), and Cangort (two locations)
 - In 2017, static detectors were deployed at Knockanacree Woods near Cloughjordan, Cangort, and Parteen Basin
 - In 2018, static detectors were deployed at Knockanacree Woods near Cloughjordan, Cangort, and Parteen Basin.
268. During passive static bat detector surveys undertaken by Bat Eco Services between 2019 and 2025, 92 units were deployed in several walking transect areas, at major watercourse crossings, and in buildings along the route of the Proposed Project (typically between June and October).
269. In total 104 static locations (note: some locations were sampled multiple times) were sampled with data collated for 146 surveillance periods (5,318 hrs) and recording a total of 186,561 bat passes. All nine resident bat species were recorded during the static surveillance. Soprano pipistrelle was the most frequently recorded bat species and represented 50% of the total number of bat passes and was recorded during 133 (91.1%) of the static surveillance periods. Table 8.33 summarises the results. For full details in relation to locations and results of the static surveys undertaken between 2016 and 2025, refer to Annex Table 9.1 and Table 9.2 in Appendix A8.9 (Bat Surveys Report).

Table 8.33: Summary of Bat Passes Recorded During Static Surveillance Surveys Completed Between 2016 and 2025

Species	No. of bat passes	% of bat passes	No. of static units	% of static units
Soprano pipistrelle	93,230	50.0	133	91.1
Common pipistrelle	64,949	34.8	131	89.7
Leisler's bat	19,021	10.2	130	89.0
Brown long-eared bat	547	0.3	73	50.0
Daubenton's bat	1,432	0.8	52	35.6
Whiskered bat	237	0.1	35	24.0
Natterer's bat	406	0.2	57	39.0
<i>Myotis</i> species	5,584	3.0	75	51.4
Lesser horseshoe bat	1	0	1	0.7
Nathusius' pipistrelle	62	0	17	11.6
<i>Pipistrellus</i> species	1,092	0.6	22	15.1

270. As mentioned, all nine resident bat species were recorded during all of the bat surveys and a total of 5,567 bat encounter records were collated (i.e. discrete geo-reference locations) by the array of bat surveys undertaken: dusk and dawn surveys, static surveillance (n=104 points, 146 surveillance periods), walking transects and driving transects (Table 8.34). Common pipistrelle (n=2,388 bat encounters, 42.9%) was the most frequently recorded bat species, soprano pipistrelle (n=1,732 bat encounters, 31.1%) was the second most frequently encountered bat species followed by Leisler's bats (863 bat encounters, 15.5%). Bat encounters for these three bat species were recorded in all areas surveyed. These three bat species are considered to be the three most common bat species in Ireland

(Roche *et al.* 2014). The location of bat encounters for the remaining bat species recorded tended to be associated with habitats particular for the bat species recorded (e.g. brown long-eared bats tended to be recorded along woodland or treeline habitats and Daubenton's bats on watercourses).

Table 8.34: Summary of Bat Encounters Recorded by Bat Surveys Completed Between 2016 and 2025

Species	Number of Bat Encounters
Brown long-eared bat	130
Common pipistrelle	2,388
Daubenton's bat	137
Leisler's bat	863
<i>Myotis</i> species	104
Nathusius' pipistrelle	27
Natterer's bat	102
Soprano pipistrelle	1,732
Whiskered bat	66
Lesser horseshoe bat	1
<i>Pipistrellus</i> species	17

8.3.2.2.7 Summary of Passive Static Unit Analysis

271. A total of 146 static surveillance periods were completed during 2016 to 2025 at 104 discrete geo-referenced locations. As a general guide, activity level is determined as follows: Low = <10 bat passes/hr; Medium = >10 to <50 bat passes/hr; High = >50 bat passes/hr). For this analysis, all of the *Myotis* species data were combined but due to the low level of brown long-eared bats and Nathusius' pipistrelle bat passes, these two species were not included in the analysis. A low level of bat activity was recorded at all static locations for these two species but their presence is noteworthy, regardless of the activity level. In relation to brown long-eared bats this is because the echolocation call of this species is quiet and therefore the bats are required to be flying within 5m of the microphone to be recorded. In relation to Nathusius' pipistrelle, the population and distribution of this species is still not fully understood. This analysis was undertaken to provide a key to important bat activity areas located within the study area using the four most common bat species and/or family group.

Soprano Pipistrelle

272. Soprano pipistrelle was the most frequently recorded bat species on the static units and represented 50% of the total number of bat passes and was recorded on 133 (91.1%) of the static surveillance periods. Fifteen of the 146 surveillance periods recorded, on average, a high level of bat activity for this bat species. This represents 11 discrete locations, five of which were statics located at river crossings, one located on a woodland edge adjacent to a riverbank, and the remaining five located within woodlands. Medium levels of bat activity were recorded during 30 surveillance periods at 25 discrete points. Figure 5b in Appendix A8.9 (Bat Surveys Report) illustrates the locations of high and medium bat activity levels of soprano pipistrelle recorded along the Proposed Project.

Common Pipistrelle

273. Common pipistrelle was the second most frequently recorded bat species and represented 34.8% of the total number of bat passes and was recorded during 131 (89.7%) of the static surveillance periods. Twelve of the 146 surveillance periods recorded, on average, a high level of bat activity for this bat species (ten discrete points in farmland and the remaining two locations in woodland). Medium levels of bat activity were recorded during 37 surveillance periods at 30 discrete points. Figure 5d in Appendix A8.9 (Bat Surveys Report) illustrates the locations of high and medium bat activity levels of common pipistrelle recorded along the Proposed Project.

Leisler's Bat

274. Leisler's bats were recorded during 130 (89%) of the static surveillance periods and a total of 19,201 (10.3% of total number of bat passes) bat passes were recorded. Two of the 146 surveillance periods recorded, on average, a high level of bat activity for this bat species (two discrete locations: woodland (TOBIN Static K) and river crossing (TOBIN Static E)). Medium levels of bat activity were recorded during seven surveillance periods at six discrete points.

Myotis Species

275. *Myotis* species were recorded during 103 (70.5%) of the static surveillance periods and a total of 7,668 (4.1% of total number of bat passes) bat passes were recorded. Two of the 146 surveillance periods recorded, on average, a high level of bat activity for this bat species (two discrete locations: river crossings (Statics 41 and 42)). Medium levels of bat activity were recorded during five surveillance periods at five discrete points, four of which were river crossings and the remaining one a woodland.

8.3.2.2.3 Summary of Bat Survey Results

276. All nine bat species resident in Ireland were recorded during the array of bat surveys completed from 2016 to 2025 (Table 8.35). A summary of the bat species recorded is provided hereunder:
- Common pipistrelle (n= 2,388 bat encounters, 42.9%) was the most frequently recorded bat species. A total of 15 roosts were recorded for this bat species
 - Soprano pipistrelle (n= 1,732 bat encounters, 31.1%) was the second most frequently encountered bat species. A total of eight roosts were recorded for this bat species
 - Leisler's bats (863 bat encounters, 15.5%) was the third most frequently recorded bat species and a total of five roosts were recorded
 - Daubenton's bat, Natterer's bat and brown long-eared bats are less common bat species but are widely distributed across the country
 - Whiskered bat is a less common bat species with a more restricted distribution. The majority of the whiskered bat records noted during surveys were concentrated in Counties Tipperary and Offaly
 - Lesser horseshoe bat was only recorded once during the array of surveys, and this was located north-west of Birdhill. This species' territory is the six western seaboard counties which do 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).

Table 8.35: Bat Ecological Evaluation Results for Each Bat Species Recorded

Bat Species	Survey Results	Evaluation Value
Whiskered bat	Roosts (x2) Foraging habitat Commuting routes	County importance (higher value) – County Tipperary and Offaly
Brown long-eared bat	Roosts (x6) Foraging habitat Commuting routes	Local importance (higher value) – County Tipperary and Offaly
Natterer's bat	Roosts (x9) Tree roost (x1) Foraging habitat Commuting routes	Local importance (higher value) – County Tipperary and Offaly
Leisler's bat	Roosts (x4) Tree Roost (x1) Foraging habitat Commuting routes	Local importance (higher value) – County Kildare and Offaly
Soprano pipistrelle	Roosts (x6) Tree roost (x2) Foraging habitat Commuting routes	Local importance (higher value) – County Tipperary and Offaly
Common pipistrelle	Roosts (x15) Tree roost (x1) Foraging habitat Commuting routes	Local importance (higher value) – County Tipperary, Kildare and Offaly
Daubenton's bat	Tree roost (x1) Foraging habitat Commuting routes	Local importance (higher value) – County Tipperary
Nathusius' pipistrelle	Foraging habitat Commuting habitat	Local important (higher value) – County Tipperary, Offaly and Kildare
Lesser horseshoe bat	Night roost (x1) Foraging habitat Commuting routes	Local importance (higher value) – Building 1 and immediate surroundings, County Tipperary

8.3.2.3 Mammals – Eurasian Badger

8.3.2.3.1 Eurasian Badger – Desktop Review Results

277. Badgers are listed on Appendix III of Council Decision 82/72/EEC, the Convention on the Conservation of European Wildlife and Natural Habitats 1982 (Bern Convention 1982) as a species to be protected and whose exploitation must be regulated. This species, and their breeding and resting places, are also protected in Ireland under the Wildlife Acts.
278. The NBDC has an extensive database of badger sett locations throughout the country. A data request was made to the NBDC (in 2016) for known badger setts within the 10km grid squares encompassing the Proposed Project. A similar request was made (in 2019 and 2022) to the DAFM for badger sett data within a 500m radius of the Proposed Project. These data, as well as data downloaded from the NBDC website most recently in 2025, were utilised to advise on the positioning of the Proposed Project. This approach aimed to cause least potential disturbance to badger setts through avoidance. In this regard, previous iterations of the project close to a known badger sett were relocated, where feasible, as a precautionary measure in order to avoid potential impacts.

279. An updated data request was made in 2025 to DAFM (with consent from NPWS) for badger setts present within the 10km grid squares surrounding the Proposed Project. From these data, a total of 2,516 setts were identified, of which 93 are present within 150m of the Proposed Project and 15 are present within the Proposed Project.
280. Additionally, an updated data request was made to NPWS in 2025, which provided 160 historical records of badger within the following 10km grid squares encompassing the Proposed Project: R56, R66, R67, R76, R77, R87, R88, R98, N00, N10, N11, N21, N31, N41, N42, N52, N62, N72, N83, N92 and N93. Specific details on the type of badger record (e.g. sett/activity) and locations were not provided. However, within the dataset, 1km grid square data were also provided which showed potential overlaps with the Proposed Project in 12 locations: near Chainage TWA – 23500 (four records), near Chainage TWC – 4500 (one record), near Chainage TWC – 18000 (one record), near Chainage TWC – 20000 (one record), near Chainage TWC – 22000 (two records), near Chainage TWC – 23000 (one records), near Chainage TWE – 16000 (one record), and near Chainage TWE – 16500 (one record). Again, specific details and locations were not provided in order to confirm if these records are definitively within the boundary of the Proposed Project.

8.3.2.3.2 Eurasian Badger – Field Survey Results

281. During field surveys between 2016 and 2025, badgers were determined to be present in an area if any of the following signs were noted: setts, trails, latrines, hair, prints, and/or feeding signs. Infrequent evidence of badgers and a number of breeding, outlier, or other setts were recorded during the field surveys conducted within the study area of the Proposed Project:
- A total of 593 records of badger field signs (badger activity, setts and potential setts) were recorded within the study area between 2016 and 2025
 - Within the Proposed Project, a total of 47 known badger setts were noted of which 23 were active and 24 were inactive. Six main setts were recorded. At the main sett recorded at poleset 60B, two juvenile badgers were seen exiting the sett within the Proposed Project (Table 8.36). Of these 47 badger setts, 33 would likely be closed/destroyed to facilitate the Proposed Project
 - Within 150m of the Proposed Project, a total of 197 known badger setts were recorded of which 101 were active and 96 were inactive (Table 8.37). Of the 197 setts, 37 were main setts, which are used for breeding. These badger setts would likely be disturbed (noise disturbance) during the construction phase of the Proposed Project.
282. Badger setts recorded within the study area are shown in Figures 8.109 to Figure 8.212.

Table 8.36: Location of Known Badger Setts Within the Proposed Project, Status, Proposed Construction Activity in the Area and Year(s) Recorded

Chainage/Approximate Location	Type of Sett	Badger Sett Status	Construction Activity	Years Recorded	Retained/ Closed
Poleset 60B	Main	Active	38 kV Uprate Works	2024	Retained
Poleset 73B	Subsidiary	Inactive	38 kV Uprate Works	2024	Retained
Poleset 81B	Outlier	Inactive	38 kV Uprate Works	2024	Retained
Poleset 248	Outlier	Active	38 kV Uprate Works	2021, 2024	Retained
RW – 500	Outlier	Active	Construction of access road	2024, 2025	Closed
RW – 1000	Outlier	Inactive	Pipe Laying	2023, 2024	Retained
RW – 1000	Outlier	Inactive	Pipe Laying	2023, 2024	Retained
RW – 1400	Outlier	Inactive	Pipe Laying	2018, 2024	Closed
Access road to WTP	Outlier	Active	Construction of access road	2024	Closed

Chainage/Approximate Location	Type of Sett	Badger Sett Status	Construction Activity	Years Recorded	Retained/ Closed
Access road to WTP	Outlier	Active	Construction of access road	2024	Closed
Access road to WTP	Outlier	Active	Construction of access road	2020, 2021, 2024	Closed
Access road to WTP	Outlier	Active	Construction of access road	2021	Closed
Access road to WTP	Outlier	Active	Construction of access road	2021	Closed
Access road to WTP	Outlier	Inactive	Construction of access road	2024	Closed
TW – 16200	Outlier	Active	Pipe Laying	2020, 2022, 2024	Closed
TW – 27200	Main & Annex	Inactive	Pipe Laying	2017, 2018, 2024	Retained
TW – 27300	Main	Active	Pipe Laying	2024	Retained
TW – 30900	Subsidiary	Active	Pipe Laying	2024	Closed
TW – 31100	Outlier	Inactive	Pipe Laying	2017, 2019	Closed
TW – 31100	Subsidiary	Inactive	Pipe Laying	2019	Closed
TW – 31200	Outlier	Active	Pipe Laying	2017, 2020, 2022	Closed
TW – 31200	Subsidiary	Inactive	Pipe Laying	2019, 2024	Closed
TW – 31700	Subsidiary	Active	Pipe Laying	2024	Closed
TW – 31700	Subsidiary	Inactive	Pipe Laying	2019	Closed
TW – 31700	Outlier	Active	Pipe Laying	2020, 2022	Closed
TW – 31700	Outlier	Inactive	Pipe Laying	2017, 2018, 2024	Closed
TWA – 300	Outlier	Inactive	Pipe Laying	2024	Retained
TWA – 19900	Outlier	Inactive	Pipe Laying	2024, 2025	Retained
TWB – 5200	Main	Inactive	Pipe Laying	2017, 2018, 2019	Closed
TWB – 5600	Outlier	Inactive	Pipe Laying	2016	Closed
TWB – 16800	Outlier	Active	Pipe Laying	2025	Retained
TWB – 23800	Outlier	Inactive	Pipe Laying	2019	Retained
TWB – 27500	Outlier	Active	Pipe Laying	2018	Closed
TWC – 1000	Outlier	Active	Pipe Laying	2016, 2018	Closed
Pipe Storage Depot (Derryweelan)	Subsidiary	Active	Construction of compound	2017, 2018, 2025	Retained
TWC – 17900	Outlier	Inactive	Pipe Laying	2017, 2019, 2020, 2024	Closed
TWC – 17900	Outlier	Active	Pipe Laying	2016	Closed
TWC – 19600	Outlier	Inactive	Pipe Laying	2022	Closed
TWD – 1700	Outlier	Active	Pipe Laying	2020	Closed
TWD – 2900	Outlier	Active	Pipe Laying	2025	Closed
TWD – 17000	Main	Inactive	Pipe Laying	2019	Closed
TWD – 19100	Main	Active	Pipe Laying	2017, 2019	Closed
TWD – 26900	Annex	Inactive	Pipe Laying	2017	Closed
TWD – 26900	Annex	Active	Pipe Laying	2024	Closed
TWE – 500	Outlier	Inactive	Pipe Laying	2024	Closed
TWE – 5000	Outlier	Inactive	Pipe Laying	2025	Closed
TWE – 9000	Subsidiary	Inactive	Pipe Laying	2017	Retained

Table 8.37: Location of Known Badger Setts Within 150m of the Proposed Project, Status and Years(s) Recorded

Chainage / Location	Type of Sett	Badger Sett Status	Distance from Proposed Project (m)	Year(s) Recorded
Poleset 80B	Outlier	Inactive	17	2021, 2024
RWI&PS Site/RW – 1	Main	Active	56	2016, 2024
RWI&PS Site/RW – 1	Subsidiary	Inactive	60	2016, 2018, 2024, 2025
RWI&PS Site/RW – 1	Subsidiary	Inactive	25	2018, 2025
RWI&PS Site/RW – 1	Subsidiary	Active	102	2016, 2025
RWI&PS Site/RW – 1	Subsidiary	Inactive	150	2016, 2025
RW – 200	Outlier	Inactive	13	2022, 2025
RW – 1600	Outlier	Inactive	31	2024
RW – 1800	Outlier	Inactive	133	2020
RW – 1900	Subsidiary	Active	104	2017
RW – 1900	Outlier	Inactive	101	2017, 2020, 2024
RW – 2000	Subsidiary	Active	82	2017
Access road to WTP	Outlier	Inactive	41	2021, 2024
TW – 400	Outlier	Inactive	46	2017
TW – 6300	Outlier	Active	28	2017, 2019, 2020, 2025
TW – 6300	Subsidiary	Inactive	33	2017, 2019, 2020, 2025
TW – 6300	Outlier	Inactive	34	2019, 2025
TW – 6300	Outlier	Inactive	44	2025
TW – 6300	Outlier	Inactive	46	2025
TW – 13600	Outlier	Active	25	2025
TW – 14400	Subsidiary	Inactive	50	2020, 2024
TW – 14400	Annex	Active	52	2020, 2024
TW – 14400	Main	Active	42	2017, 2024
TW – 14400	Annex	Active	42	2018, 2019
TW – 14400	Annex	Inactive	51	2022
TW – 14600	Outlier	Active	74	2018
TW – 18400	Outlier	Inactive	59	2017, 2019
TW – 18800	Outlier	Active	35	2018
TW – 19500	Outlier	Inactive	76	2025
TW – 21000	Outlier	Active	18	2024
TW – 21300	Outlier	Inactive	25	2021, 2024
TW – 23200	Outlier	Active	11	2025
TW – 23500	Main	Active	114	2024
TW – 24300	Main	Active	123	2024
TW – 24500	Outlier	Active	71	2020, 2022
TW – 26900	Outlier	Inactive	10	2020, 2022, 2024
TW – 27000	Subsidiary	Inactive	17	2022
TW – 27000	Subsidiary	Inactive	13	2024
TW – 27000	Main	Active	8	2024
TW – 27200	Annex	Inactive	1	2019

Chainage / Location	Type of Sett	Badger Sett Status	Distance from Proposed Project (m)	Year(s) Recorded
TW – 28400	Subsidiary	Inactive	10	2018
TW – 28400	Subsidiary	Inactive	30	2019
TW – 28400	Subsidiary	Active	55	2018
TW – 28500	Subsidiary	Inactive	90	2019
TW – 28500	Subsidiary	Inactive	104	2018
TW – 28700	Outlier	Inactive	132	2018
TW – 29300	Main	Active	2	2024
TW – 31100	Main	Active	45	2022
TW – 31300	Outlier	Active	81	2020, 2022
TW – 31300	Main	Active	116	2022
TW – 31500	Outlier	Inactive	140	2016
TW – 32000	Outlier	Active	29	2017, 2018
TW – 32100	Subsidiary	Inactive	7	2017, 2018
TW – 32100	Main	Active	6	2019, 2024
TW – 32200	Outlier	Active	124	2022
TW – 32600	Outlier	Active	60	2020, 2022, 2024
TW – 33000	Outlier	Active	30	2020, 2022, 2024
TW – 34600	Outlier	Active	50	2022
TW – 35000	Main	Inactive	140	2020, 2022
TW – 36500	Main	Active	44	2020, 2022, 2024, 2025
TW – 36500	Main	Active	50	2016, 2025
TW – 36500	Outlier	Inactive	51	2024, 2025
Access road to BPT	Outlier	Active	97	2020, 2025
TWA – 200	Main	Active	106	2022, 2024
TWA – 3900	Outlier	Inactive	44	2016
TWA – 8100	Outlier	Inactive	5	2024
TWA – 11700	Outlier	Active	90	2020, 2025
TWA – 15100	Subsidiary	Active	75	2019, 2020, 2022
TWA – 15100	Main	Inactive	81	2017
TWA – 15100	Subsidiary	Inactive	140	2017, 2019, 2020, 2022, 2024
TWA – 17400	Outlier	Inactive	61	2022
TWA – 17400	Outlier	Inactive	55	2022, 2024
TWA – 18200	Main	Active	70	2017, 2018, 2019, 2024
TWA – 19900	Outlier	Inactive	17	2024, 2025
TWA – 19900	Outlier	Active	24	2024, 2025
TWA – 19900	Outlier	Inactive	1	2021, 2022
TWA – 27300	Main	Active	10	2019
TWA – 27300	Subsidiary	Active	38	2019
TWA – 27500	Subsidiary	Active	78	2019
TWA – 27500	Subsidiary	Inactive	75	2019
TWA – 27500	Subsidiary	Active	86	2020

Chainage / Location	Type of Sett	Badger Sett Status	Distance from Proposed Project (m)	Year(s) Recorded
TWB – 100	Main	Active	62	2020
TWB – 900	Outlier	Inactive	102	2025
Road leading to Birr substation	Main	Active	43	2024
TWB – 2500	Outlier	Active	74	2024
TWB – 3500	Outlier	Inactive	18	2024
TWB – 4900	Outlier	Inactive	77	2024
TWB – 5100	Subsidiary	Inactive	36	2017, 2018, 2019
TWB – 5400	Main	Inactive	141	2019
TWB – 6700	Main	Active	63	2019, 2024
TWB – 6700	Annex	Active	66	2024
TWB – 6700	Annex	Active	68	2017, 2018, 2024
TWB – 6700	Annex	Inactive	56	2024
TWB – 10300	Main	Active	6	2017, 2019, 2020, 2022, 2024
TWB – 11900	Outlier	Active	45	2018
TWB – 12200	Outlier	Inactive	77	2016
TWB – 12200	Outlier	Inactive	60	2020, 2022
TWB – 12200	Outlier	Inactive	84	2022
TWB – 12500	Outlier	Inactive	22	2018
TWB – 12500	Outlier	Active	6	2018
TWB – 12600	Main	Inactive	26	2022, 2024
TWB – 12700	Outlier	Active	26	2019
TWB – 14000	Outlier	Inactive	15	2018
TWB – 14100	Outlier	Inactive	6	2024
TWB – 14800	Outlier	Active	108	2020
TWB – 16100	Main	Active	83	2017, 2019, 2020, 2022, 2024
TWB – 16200	Outlier	Active	7	2018
TWB – 16200	Outlier	Inactive	9	2020, 2022
TWB – 16200	Outlier	Inactive	14	2017, 2017, 2024
TWB – 16200	Outlier	Inactive	86	2016, 2019
TWB – 16400	Main	Inactive	55	2018, 2019, 2020
TWB – 23600	Outlier	Inactive	26	2016, 2017, 2019, 2024
TWB – 23700	Outlier	Inactive	1	2018
TWB – 25600	Outlier	Active	65	2020, 2025
TWB – 26300	Outlier	Active	15	2018
TWC – 7000	Outlier	Inactive	89	2018
Pipe Storage Depot Derryweelan	Outlier	Inactive	0.3	2019, 2025
TWC – 8900	Main	Active	43	2020
TWC – 8900	Subsidiary	Active	47	2019, 2024
TWC – 8900	Main	Active	29	2022, 2024
TWC – 8900	Main	Active	24	2024
TWC – 8900	Subsidiary	Active	35	2017, 2024

Chainage / Location	Type of Sett	Badger Sett Status	Distance from Proposed Project (m)	Year(s) Recorded
TWC – 8900	Subsidiary	Active	45	2017
TWC – 8900	Subsidiary	Active	45	2018
TWC – 8900	Subsidiary	Active	62	2018, 2019
TWC – 9000	Subsidiary	Inactive	15	2016, 2019
TWC – 9000	Subsidiary	Active	26	2018, 2019
TWC – 13000	Outlier	Active	118	2016, 2019, 2021
TWC – 16400	Outlier	Inactive	12	2024
TWC – 16400	Subsidiary	Active	21	2020, 2024
TWC – 16400	Subsidiary	Inactive	4	2020, 2024
TWC – 16400	Annex	Inactive	8	2017, 2018, 2020
TWC – 16400	Main	Inactive	7	2019, 2024
TWC – 16400	Outlier	Inactive	25	2018, 2024
TWC – 16500	Annex	Active	28	2017, 2018, 2020, 2024
TWC – 16500	Annex	Inactive	45	2017, 2020, 2024
TWC – 16500	Annex	Active	53	2017, 2020, 2024
TWC – 17700	Outlier	Inactive	19	2018
TWC – 17700	Main	Inactive	13	2024
TWC – 18000	Outlier	Inactive	150	2020
TWC – 18200	Outlier	Active	91	2018
TWC – 20400	Outlier	Inactive	58	2019
TWC – 22300	Main	Active	80	2024
TWC – 22300	Main	Active	85	2020, 2024
TWC – 22300	Subsidiary	Inactive	78	2024
TWC – 22300	Subsidiary	Inactive	84	2016
TWD – 800	Outlier	Active	27	2018, 2020, 2024
TWD – 1400	Outlier	Inactive	22	2018
TWD – 1800	Outlier	Active	99	2016
TWD – 1900	Outlier	Active	42	2018
TWD – 2000	Main	Active	21	2018
TWD – 2000	Outlier	Active	0.7	2019
TWD – 2100	Main	Active	57	2016
TWD – 2100	Main	Active	20	2019
TWD – 7700	Outlier	Active	128	2016
TWD – 17000	Outlier	Active	9	2019
TWD – 17000	Outlier	Active	13	2018
TWD – 17100	Outlier	Inactive	12	2018, 2019, 2025
TWD – 17200	Outlier	Inactive	15	2022, 2025
TWD – 17200	Outlier	Inactive	22	2025
TWD – 20200	Outlier	Inactive	64	2016
TWD – 20200	Outlier	Inactive	93	2017, 2019
TWD – 20700	Outlier	Inactive	60	2022

Chainage / Location	Type of Sett	Badger Sett Status	Distance from Proposed Project (m)	Year(s) Recorded
TWD – 21900	Subsidiary	Active	39	2019
TWD – 21900	Subsidiary	Active	10	2017
TWD – 21900	Subsidiary	Inactive	18	2019
TWD – 22000	Subsidiary	Active	38	2016, 2019
TWD – 22000	Subsidiary	Active	55	2018
TWD – 22100	Subsidiary	Inactive	60	2017
TWD – 24300	Outlier	Active	23	2024
TWD – 25500	Outlier	Inactive	29	2017, 2018
TWD – 25600	Outlier	Active	34	2024
TWD – 25500	Outlier	Active	35	2024
TWD – 26500	Outlier	Active	34	2019
TWD – 26700	Outlier	Active	106	2017
TWD – 26900	Main	Active	1	2024
TWD – 27000	Annex	Active	1	2024
TWD – 27000	Outlier	Inactive	109	2017, 2018
TWD – 29100	Outlier	Inactive	20	2025
TWD – 29400	Subsidiary	Active	82	2025
TWD – 29500	Main	Active	8	2017, 2020, 2022, 2025
TWD – 29500	Main	Active	28	2025
TWD – 31200	Outlier	Active	32	2024
TWD – 32100	Outlier	Inactive	81	2020, 2022
TWD – 32200	Outlier	Inactive	80	2020, 2024
TWD – 32200	Outlier	Inactive	70	2019
TWD – 32200	Outlier	Inactive	98	2018, 2019
TWD – 32200	Outlier	Active	18	2024
TWD – 33400	Outlier	Inactive	16	2018
TWD – 33400	Outlier	Inactive	27	2016
TWE – 1100	Outlier	Inactive	6	2020, 2022
TWE – 1200	Outlier	Inactive	89	2022, 2024
TWE – 4900	Outlier	Active	125	2024, 2025
TWE – 8800	Outlier	Active	80	2017, 2018, 2019, 2024
TWE – 9100	Subsidiary	Active	12	2020, 2024
TWE – 9100	Subsidiary	Inactive	96	2017, 2024
TWE – 14800	Outlier	Active	75	2022, 2024

283. Badger group size typically consists of four to five individuals (Smal 1995). Badger numbers are found to be at their highest in areas of high-quality grazing land (Smal 1995); a habitat type which is common within the Proposed Project. Badger setts are typically located in unmanaged wood vegetation associated with hedgerows/linear woodland rather than in scrub or woodlands (Hayden and Harrington 2000). Badger populations are considered stable in Ireland (Sleeman *et al.* 2009). The results of the badger surveys indicate a minimum of two badger social groups are present within the Proposed Project and a further 39 are present within 150m of the Proposed Project. The badger signs most frequently encountered during the surveys included footprints, trails and evidence of feeding.

284. The potential for an unknown badger sett to be disturbed by the development is low considering the majority of potential badger habitat within the Proposed Project was surveyed, with the exception of lands where access for surveys was not permitted.

8.3.2.4 Mammals – Otter

8.3.2.4.1 Otter – Desktop Review Results

285. The otter, and their breeding and resting places, are protected in Ireland under the Wildlife Acts and listed on the Irish Red Data book as ‘Internationally Important’. The otter is also protected under Annex II and IV of the Habitats Directive, giving it strict protection as a species of community interest whose conservation requires EU nations to designate SACs. In addition, the otter is listed in Appendix II of the Bern Convention (1982) which has been ratified by Ireland.

286. The NBDC has an extensive database of otter records throughout the country. A data request was made to the NBDC (in 2016) for known otter data within the 10km grid squares encompassing the Proposed Project. In 2010 and 2011 the NPWS carried out a National Otter Survey which provided a preliminary assessment of the species’ conservation status for Article 17 reporting under the Habitats Directive. The online data from this survey, as well as NBDC records were utilised during the route selection process and potentially suitable otter habitat and breeding sites were avoided, where feasible.

287. The NBDC online database was reviewed again, most recently in 2025, for otter records within the 10km grid squares encompassing the Proposed Project. From this, a total of 328 otter records were identified.

288. Additionally, an updated data request was made to NPWS in 2025, which provided records of otter within the following 10km grid squares encompassing the Proposed Project: R56, R66, R67, R76, R77, R87, R88, R98, R99, N00, N10, N11, N21, N31, N41, N42, N52, N62, N72, N92, S09 and O03,

8.3.2.4.2 Otter – Field Survey Results

289. Otter surveys were carried out within the study area (i.e. 150m) of the Proposed Project between 2016 and 2025 (Section 8.2.5.1.2). The following signs of otter presence were recorded during these field surveys:

- A total of 112 records of otter field signs (otter activity, holts and potential holts) were recorded within the study area between 2016 and 2025.
- A total of three otter holts were identified within the Proposed Project, of which two were confirmed active and one was inactive (Table 8.38).
- A total of 12 otter holts were recorded within 150m of the Proposed Project (Table 8.39).

Table 8.38: Location of Known Otter Holts Within the Proposed Project, Status, Proposed Construction Activity in the Area and Year(s) Recorded

Chainage	Location	Status	Construction Activity	Year Recorded	Figure
TW – 700	Kilmastulla, County Tipperary	Active	Pipe Laying (open trench)	2016	8.117
TWA – 13000	Boveen, County Offaly	Inactive	Pipe Laying (trenchless crossing)	2017	8.144
TWB – 24800	Gorteen, County Offaly	Active	Pipe Laying (trenchless crossing)	2018	8.170

Table 8.39: Location of Otter Holts Within 150m of the Proposed Project, Status and Year(s) Recorded

Chainage	Location	Distance from Proposed Project (m)	Status	Year Recorded	Figure
TW – 900	Kilmastulla, County Tipperary	25	Active	2018	8.118
TW – 1400	Kilmastulla, County Tipperary	18	Inactive	2016	8.118
TWA – 25900	Breaghmore, County Offaly	74	Active	2019	8.150
TWA – 27700	Cloghanmore, County Offaly	112	Active	2019	8.150
TWB – 12600	Derries, County Offaly	1	Active	2018	8.164
TWB – 14900	Gortacur, County Offaly	90	Inactive	2018	8.164
TWB – 15000	Gortacur, County Offaly	70	Inactive	2016	8.165
TWC – 19100	Ballynakill, County Offaly	135	Inactive	2019	8.182
TWC – 22800	Ballynakill, County Offaly	145	Active	2019	8.184
TWD – 29100	Newtownmoneenluggagh, County Kildare	84	Inactive	2020	8.200
TWE – 10000	Castledillon Upper, County Kildare	147	Active	2016	8.208
TWE – 10000	Castledillon Upper, County Kildare	149	Active	2018	8.208

290. Otter signs (spraints, trails, couches, tracks, and slides) were recorded along the western and south-eastern shore of Parteen Basin and along the following watercourses crossed by the Proposed Project: Figile (WCX056), Ballykilleen (WCX055), River Liffey (WCX073), Nenagh (WCX016), Breaghmore (WCX031), Camcor (WCX032), drainage ditches at WBX034, WBX037, and WBX068, 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).
291. Otters occur in Ireland at an average density of one otter per 10km of river habitat; density will vary with the productivity of the river (Reid *et al.* 2013). This is largely aligned with the results of the Proposed Project field surveys. 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.
292. A number of areas with suitable breeding habitat would be traversed by the Proposed Project (riparian river corridors). However, the potential for an unknown otter holt or natal den to be disturbed by the development is low, given the majority of potential otter habitat within the Proposed Project was surveyed, with the exception of no-access lands (12.5%; Section 8.2.9).

8.3.2.5 Mammals – Other Mammal Species

8.3.2.5.1 Other Mammal Species – Desktop Review Results

293. The Irish hare is a quarry species (may be hunted under licence) and has limited protection under domestic legislation. It is listed in the Irish Red Data book as ‘Least Concern’ (Marnell *et al.* 2019) and in Appendix III of the Bern Convention (1982) as a protected species. It is also listed under Annex V of the Habitats Directive as a species which may be exploited but not to the extent that its favourable conservation status is compromised (Hayden & Harrington 2000). The NBDC records show Irish hare was recorded within each 10km grid square surrounding the Proposed Project. Additionally, NPWS data of rare and threatened protected species held records in the following 10km grid squares; R56, R66, R67, R76, R77, R87, R98, R99, S08, S09, N00, N10, N11, N21, N31, N41, N42, N52, N62, N72, N73,

N83, N93 and O03. It is therefore considered likely that this species could be present in farmland and peatland habitats throughout the Proposed Project.

294. The pine marten is fully protected in Ireland under the Wildlife Acts. It is also protected under Annex V of the Habitats Directive. The pine marten is listed on Appendix III of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982) which Ireland has ratified. Pine marten is found mainly in deciduous and coniferous woodland, but has also adapted to scrubland. The population is thought to be increasing in Ireland (NPWS 2019c). A review of the NBDC online database showed records of pine marten in each of the 10km grid squares surrounding the Proposed Project. The NPWS records of rare and threatened protected species showed pine marten in the following 10km grid squares; R56, R67, R76, R88, R98, R99, S08, N00, N10, N11, N21, N41, N52, N62, N72 and N83. It is therefore considered likely that this species could be present in woodland and scrubland habitats throughout the Proposed Project.
295. Fallow deer (*Dama dama*) is a non-native species protected under the Wildlife Acts, although similar to Irish hare, they are listed as a quarry species and can be hunted under licence at certain times of the year. Fallow deer are relatively common in wooded areas within the midlands of Ireland, particularly in the wider surroundings of Lough Derg and the Slieve Bloom mountains. A review of the NBDC online database showed fallow deer was recorded in the 10km grid squares R56, R66, R67, R76, R77, R87, R88, R98, R99, S09, N00, N10, N11, N21, N31, N41, N42, N52, N62, N72, N73 and O03. The NPWS data for rare and threatened protected species held records in the 10km grid squares; R56, R67, R76, R77, R87, R98, S08, N00, N10, N11, N21, N31 and N41. It is therefore considered likely that this species could be present in woodland and grassland habitats throughout the Proposed Project.
296. Sika deer (*Cervus nippon*) is also a non-native species and is protected under the Wildlife Acts. The main herds of wild Sika deer are concentrated in counties Kerry, Wicklow, Tyrone and Fermanagh with some establishing herds in counties Dublin, Kildare, Carlow, Cork and Donegal. A review of NBDC datasets found records of sika deer present within the 10km grid squares R76, N92 and O03. It is therefore considered possible that this species could be present in woodland habitats within the Proposed Project, particularly in Dublin and Kildare.
297. Red deer (*Cervus elaphus*) are also protected under the Wildlife Acts but are listed as a quarry species. A review of NBDC datasets show red deer present within the 10km grid squares O03, R67, R77, R87, N11, N21, N73, N83, N92 and N93; while the NPWS rare and threatened protected species data held records in the 10km grid squares R67 and R77. It is therefore considered possible that this species could be present in woodland habitats within the Proposed Project.
298. The Irish stoat is protected under the Wildlife Acts and on Appendix III of the Bern Convention. They are widespread throughout Ireland, with records in every county. A review of the NBDC online database showed records within the 10km grid squares surrounding the Proposed Project; R56, R67, R76, R77, R87, R88, R98, S08, S09, N00, N10, N11, N21, N31, N41, N52, N62, N73, N83, N92, N93 and O03. The NPWS data of rare and threatened protected species held records in the 10km grid squares; R56, R66, R76, R77, R87, R99, N00, N10, N83, N93 and O03. It is therefore considered likely that this species could be present in woodland, farmland, and hedgerow habitats throughout the Proposed Project.
299. Pygmy shrew (*Sorex minutus*) is protected under the Wildlife Acts and on Appendix III of the Bern Convention and are found throughout Ireland in a variety of habitats ranging from areas bordering coniferous and deciduous woodland to any area with good ground cover such as grasslands, heaths, hedgerows, peatlands and sand dunes. They are largely absent from heavily forested areas. A review of the NBDC online database showed that the pygmy shrew was recorded in the 10km grid squares; R56, R66, R67, R76, R87, R98, R99, S09, N00, N10, N11, N21, N31, N41, N42, N52, N62, N72, N73, N83, N92, N93 and O03. The NPWS data of rare and threatened protected species held records in 10km grid squares; R56, R76, R77, R87, R99, S09, N00 and N10. It is therefore considered likely that this species

could be present in woodland, grassland, peatland, and hedgerow habitats throughout the Proposed Project.

300. The red squirrel (*Sciurus vulgaris*) occupies a variety of woodland types across much of Ireland. It is protected under the Fifth Schedule of the Wildlife Acts and is on Schedule III of the Bern Convention. From a desktop review of NBDC records, red squirrel has been recorded within the 10km grid squares; R66, R67, R76, R77, R87, R88, R98, R99, S08, S09, N00, N10, N11, N21, N31, N41, N42, N52, N72, N73, N83, N93 and O03. The NPWS data of rare and threatened protected species held records in the grid squares; R87, S09, N00, N10, N21, N31, N41, N52, N62, N72, N83 and O03. It is therefore considered likely that this species could be present in woodland habitats throughout the Proposed Project.
301. Hedgehogs are protected under the Wildlife Acts and on Appendix III of the Bern Convention and prefer any area bordering deciduous woodlands, scrub and open grasslands. They are also known to inhabit hedgerows, meadows and suburban gardens which are open and unfenced. Upon reviewing the NBDC online database, hedgehog records were found to be in every 10km grid square surrounding the Proposed Project. The NPWS data of rare and threatened protected species held records in grid squares R77, R87, R88, R99, S09, N00, N10, N11, N21, N31, N41, N52, N62, N83, N93 and O03. It is therefore considered likely that this species could be present in suitable habitats throughout the Proposed Project.

8.3.2.5.2 Other Mammal Species – Field Survey Results

302. Records of protected mammal species recorded within the study area of the Proposed Project are shown on Figure 8.109 to Figure 8.212.
303. Irish hare was recorded on 10 occasions within the Proposed Project and on 22 occasions within the study area throughout the survey period 2016 to 2025. Sightings typically involved individuals flushed from cover in response to local disturbance.
304. During field surveys undertaken between 2016 and 2025 within the study area of the Proposed Project, evidence of pine marten was recorded on 39 occasions. Eleven of these records were within the boundary of the Proposed Project:
- Garrynateel, County Tipperary (Figure 8.116)
 - Knockadromin, County Tipperary (Figure 8.117; along the access road to the WTP)
 - Castlecranna, County Tipperary (Figure 8.121)
 - Tubbrid, County Offaly (Figure 8.143)
 - Killeenbreaghan, County Offaly (Figure 8.147)
 - Gortacur, County Offaly (Figure 8.165)
 - Island, County Offaly (Figure 8.179)
 - Clonarrow Riverlyons, County Offaly (Figure 8.179)
 - Three instances at Ticknevin, County Kildare (Figure 8.191 and Figure 8.192).
305. The remaining pine marten records (28) were within 75m of the Proposed Project. An additional five records of pine marten were recorded within 150m of the Proposed Project. Records included field signs (scat), sightings, and once deceased individual, which was the recording made within the Proposed Project at Money, County Offaly.
306. Signs and sightings of fallow deer were recorded in several areas where access was permitted. Fallow deer records were confined to parcels of land which provided cover in the form of scrub or woodland. Footprints and scat were the principal field signs recorded.

307. Sika deer tracks were recorded on one occasion in 2018 approximately 43m from the Proposed Project in Kilmastulla, County Tipperary (nearest Chainage TW – 1000).
308. Four sightings of red squirrel were recorded during multidisciplinary walkover surveys in 2020, 2024 and 2025. The 2024 sighting was recorded within the Proposed Project near Chainage TWD – 28800 in Newtownmoneenluggagh, County Kildare. Two sightings were recorded in 2025, one which was 70m from the Proposed Project in Garrynatineel, County Tipperary and another which was 117m from the 38 kV Uprate Works in Birdhill, County Tipperary. The 2020 sighting was recorded 190m (beyond the study area) from the Proposed Project in Killananny, County Offaly. No other sightings were noted during surveys undertaken between 2016 and 2025. This is likely due to the avoidance of woodland type habitats by the Proposed Project, as well as the elusive behaviour of red squirrel. Whilst red squirrel records are beginning to increase in Ireland once more (Lawton 2020), few sightings were recorded during the multidisciplinary walkover surveys for the Proposed Project, which is likely due to the lack of suitable habitat within the Zol of the Proposed Project.
309. One incidental sighting of hedgehog was recorded during the 2020 multidisciplinary walkover survey, 143m from the Proposed Project in Esker More, County Offaly. Data from NBDC show records of this species within the 10km grid squares encompassing the Proposed Project.
310. Irish stoat was not recorded during field surveys during the 2016 to 2025 period.
311. Common mammal species noted throughout the Proposed Project during field surveys undertaken between 2016 and 2025 included: rabbit (*Oryctolagus cuniculus*), and fox (*Vulpes vulpes*). Wood mouse (*Apodemus sylvatica*), pygmy shrew (*Sorex minutus*), and brown rat (*Rattus norvegicus*) are also likely to be common within the Proposed Project.
312. The most westerly section of the Proposed Project (in County Tipperary) is within the range of two introduced species: greater white-toothed shrew (*Crocidura russula*) and bank vole (*Myodes glareolus*). These species were not recorded during multidisciplinary walkover surveys, however no specific surveys for these species were conducted. American mink (*Neovison vison*) (also an introduced species) was recorded on four occasions during multidisciplinary walkover surveys: i) within the Proposed Project at Ballycon, County Offaly near Chainage TWC – 20300, ii) within the Proposed Project at Colganstown, County Dublin near Chainage TWE – 14200, iii) 114m from the Proposed Project at Newtown, County Offaly near Chainage TWC - 20200, and iv) 36m from the Proposed Project at Esker More, County Offaly near TWC - 22900. Records included field signs (scat) and sightings.

8.3.2.6 Invertebrates – Lepidoptera

8.3.2.6.1 Lepidoptera – Desktop Review Results

313. Butterflies, together with moths, make up the insect order lepidoptera, one of four species-rich insect orders in Ireland with some 1,500 recorded species. Marsh fritillary is considered one of the most endangered species in Ireland and is the only protected butterfly species in Ireland. It is protected under Annex II of the Habitats Directive and is listed under the Wildlife Acts. Known marsh fritillary sites identified during the desktop review were avoided during the route selection process. Typical habitats of marsh fritillary (wetlands used for breeding and feeding, calcareous grassland, fens, bogs, and upland heaths and grasslands) were also generally avoided by the Proposed Project.

314. Records of previously recorded protected lepidoptera species within the 26 10km grid squares which encompass the Proposed Project were downloaded from NBDC in 2025 and reviewed. The results are that marsh fritillary have previously been recorded in the following 10km grid squares: N00, N10, N11, N21, N41, N42, N52, N62, N72, N73, N83, O03, R56, R66, R67, R76, R77, R98, R99 and S09. There are previous recordings of protected lepidoptera species within the following 10km grid squares: N31, N92, N93, R87, R88 and S08.
315. Additionally, an updated request was made to NPWS in 2025, which provided records of marsh fritillary within the following 10km grid squares; R76, R87 and N62.

8.3.2.6.2 *Lepidoptera – Field Survey Results*

316. Sites along the Proposed Project, identified as having suitable habitat for protected lepidoptera species, were surveyed between 2016 and 2024. Marsh fritillary requires the presence of the larval food plant devil's-bit scabious growing within an appropriate sward height (Fowles 2003). The larvae require areas where they can receive sunlight close to the ground. Devil's-bit scabious was encountered infrequently or was absent from the majority of the Proposed Project. In general, where devil's-bit scabious was recorded, other factors such as sward height generally made the site unsuitable for breeding marsh fritillary.
317. During 2016 field surveys, three marsh fritillary webs were recorded on one occasion on the devil's-bit scabious host plant, approximately 350m south of the Proposed Project in an area of cutover bog in Derrinclare, County Offaly. In 2017, areas of devil's-bit scabious were noted; however, no marsh fritillary were recorded. In 2018, marsh fritillary were recorded on 12 occasions in total; nine records in the townlands of Cushaling, one at Island (west of Mount Lucas windfarm) and two in Ticknevin, County Kildare. In 2020, marsh fritillary was recorded on 19 occasions in total: seven records in Cushaling, County Offaly; four in Ticknevin, County Kildare; and eight in Money, County Offaly. Only one of these records was recorded within the Proposed Project (one occupied larval web with approximately five caterpillars at Ticknevin). In 2021, areas of devil's-bit scabious were noted; however, no marsh fritillary were recorded. In 2022, marsh fritillary webs were recorded on five occasions; several webs and larvae recorded in Ticknevin, County Offaly and several within the Proposed Project in Clonarrow/Riverlyons, County Offaly. In 2024, multiple marsh fritillary webs were recorded on a total of 49 occasions: 10 records within the Proposed Project in Clonarrow/Riverlyons, County Offaly; 11 records approximately 22m to 70m south of the Proposed Project in Timahoe East, County Kildare; six records both within and outside (approximately 6m to 16m) of the Proposed Project in Clonad, County Offaly; nine records within the Proposed Project in Cushaling, County Offaly; and 13 records within the Proposed Project in Ticknevin, County Kildare. The aforementioned marsh fritillary records are shown in Figure 8.109 to Figure 8.212.
318. In August 2020, specific lepidoptera (butterflies and moths) surveys were undertaken at the RWI&PS and WTP sites at the request of NPWS (Table 8.16). A full list of the lepidoptera recorded is presented in Appendix A8.10 (Lepidoptera Survey Report). Three species of moth were recorded using the actinic light-trap at the WTP site. The light-trap failed to operate at this site during the survey. It is not known why this failure occurred; no fault was found, and the trap had been functioning satisfactorily up to this date (see Section 8.2.9 for further details regarding this limitation). As a result, only a few species were recorded during the daytime survey at this site. The habitats at this site did not indicate a site of high biodiversity or suitability for rare or protected lepidoptera, and thus repeat surveys were not undertaken. In addition, no ad hoc records of protected lepidoptera have been recorded at this site during other surveys (e.g. terrestrial ecology and breeding bird surveys). Similarly, at the RWI&PS site, the numbers and diversity of lepidoptera recorded did not indicate a site of high biodiversity value or suitability for rare or protected lepidoptera, and thus repeat surveys were not undertaken. The Parteen Basin bank and its vegetation produced a number of specimens including *Nymphula nitidulata*, a moth with an aquatic larva, but no other Irish species in this category was observed.

8.3.2.7 Invertebrates – Molluscs

8.3.2.7.1 Molluscs – Desktop Review Results

319. Molluscs are members of phylum Mollusca, the second largest phylum of invertebrates. A total of 107 terrestrial molluscs have been recorded in Ireland and four species are legally protected under European legislation (*Vertigo* and *Geomalacus* species; Byrne *et al.* 2009). A NBDC review of mollusc data within the 10km grid squares encompassing the Proposed Project was undertaken. Terrestrial molluscs were found to be present in a number of locations within and surrounding the Proposed Project. Three Annex II mollusc species were recorded in the 10km grid squares surrounding the Proposed Project. Geyer's whorl snail was recorded in 10km grid squares S09, N21, N10 and N00, Desmoulin's whorl snail was recorded in 10km grid squares N11, N72, N92, N93 and O03, while there was one record of narrow-mouthed whorl snail in N93. There were several species from the IUCN Red List recorded such as field slug (*Deroceras agreste*), heath snail (*Helicella itala*), marsh whorl snail (*Vertigo antivertigo*) and smooth grass snail (*Vallonia pulchella*). Two medium impact INNS, common garden snail (*Cornu aspersum*) and Budapest slug (*Tandonia budapestensis*), have also been recorded in locations within and surrounding the Proposed Project.
320. Additionally, an updated rare and threatened protected species data request was made to NPWS in 2025, which provided records of Geyer's and Desmoulin's whorl snail within the following 10km grid squares; R99, N00, N10, N21, N72, N92, N93, and O03.

8.3.2.7.2 Molluscs – Field Survey Results

321. Sites along the Proposed Project, identified as having suitable habitat for protected mollusc species, were selected for targeted field surveys. A preliminary survey was carried out in July 2020 to assess the habitat suitability of sites flagged as potentially supporting any of the three *Vertigo* species. No habitat suitable to support any of the three target *Vertigo* species was found at Derrycrib, Annaghmore, Pass and Derrinclare. Raheenduff had potential to support Geyer's whorl snail and Desmoulin's whorl snail, while Coolfin Glebe had potential to support Desmoulin's whorl snail. None of the samples subsequently taken at these sites were positive for the presence of the target *Vertigo* species (Appendix A8.11: Vertigo Survey Report).
322. Mollusc surveys were undertaken at the RWI&PS and WTP sites in 2020 and 2021 (Section 8.2.5.1.3) at the request of NPWS (Table 8.16). At the RWI&PS, the first survey in 2020 identified a number of notable species and was followed up by a second survey in 2021. Lilljeborg's whorl snail (*Vertigo lilljeborgi*) is a rare whorl snail which was assessed in the Irish Red List as Vulnerable due to distributional decline (Byrne *et al.* 2009). A single specimen was found adjacent to the shore, an unexpected find for this man-made habitat and this part of Ireland. The snail is normally found in the west of Ireland along pristine limestone lake shores. The second significant find was several immature specimens of an unidentified snail that appeared likely to be a European species, Incarnate snail (*Monachoides incarnatus*), not hitherto recorded from either Ireland or Britain. Further searching of habitat similar to the RWI&PS site around the shores of the Parteen Basin was completed during 2021, including the original site, but yielded no additional specimens of either snail. Following the 2021 survey, the specimens originally thought to be candidate *Monachoides incarnata* were considered instead to possibly be unusually marked specimens of a different species, the brown snail (*Zenobiella subrufescens*). Several specimens were collected from the RWI&PS site during the 2021 follow up survey. Brown snail is an old woodland relic species included in the Irish non-marine mollusc Red List as Vulnerable due to long-term decline linked to habitat destruction. It should be noted that while both snails are Red Listed as Vulnerable, neither Lilljeborg's whorl snail nor brown snail are listed in Annex II of the Habitats Directive and therefore do not benefit from legal protection (Appendix A8.12: Parteen Basin Mollusc Survey Report).

323. At the WTP an exploratory mollusc survey was completed late in 2020 followed by a more in-depth survey in 2021 to ensure that the mollusc communities were adequately characterised. The results of the 2020 and 2021 surveys show that the site contains a range of notable species which are listed in Appendix A8.13 (Water Treatment Plant Mollusc Survey Report). A total of 328 invertebrate species were recorded across the two surveys of which 18 were molluscs. The key features of the invertebrate communities on-site are a rich rush pasture/wet grassland community that comprises species that are generally widespread across the landscape and therefore not at particular risk. None of the species recorded during the survey are listed in Annex II of the Habitats Directive or benefit from Red List status although it should be noted that relatively few groups of invertebrates have been Red Listed to date in Ireland.

8.3.2.8 Other Species Groups

8.3.2.8.1 Reptiles and Amphibians – Desktop Review Results

324. The common lizard is Ireland's only native reptile. It is not an Annex species, but it is protected in national legislation under the Wildlife Acts and is Least Concern on the IUCN Red List. There is one species of reptile protected under Annex II and four species of reptiles protected under Annex IV that can be found in Ireland (all marine turtle species and therefore scoped out of the assessment as they will not be impacted). A NBDC review of reptile data within the 10km grid squares encompassing the Proposed Project was undertaken. The common lizard was found to be present in a number of locations within and surrounding the Proposed Project (10km grid squares: R56, N00, N10, N72, N73, N83). Two INNS were also noted: yellow-bellied slider (*Trachemys scripta scripta*) and red-eared terrapin (*Trachemys scripta*) which are medium-impact species under the EU Regulation No.1143/2014.
325. Ireland has three native amphibians: common frog, smooth newt and the natterjack toad. All are protected in national legislation under the Wildlife Acts. The natterjack toad is protected under Annex IV of the Habitats Directive and is listed as Endangered on the IUCN Red List. The common frog is protected under Annex V of the Habitats Directive and is Least Concern on the IUCN Red List. A NBDC review of amphibian data within the 10km grid squares encompassing the Proposed Project was undertaken. Smooth newt and common frog were found to be present in a number of locations within and surrounding the Proposed Project. According to the NBDC data there is a high abundance of the Annex V species, the common frog, with records in each of the 10km grid squares within and surrounding the Proposed Project. Smooth newt was recorded in the 10km grid squares; R56, R66, R88, R98, R99, S09, N00, N10, N11, N42, N62, N72, N73, N83, N92, N93 and O03. There were no records of the natterjack toad noted within the study area during the desktop review.
326. Additionally, an updated rare and threatened protected species data request was made to the NPWS in 2025, which provided records of common frog every 10km grid square encompassing the Proposed Project. Common lizard was recorded within the 10km grid squares N00, N10, N72 and O03, while smooth newt records were present in R98, R99, N10, N52, N93 and O03.

8.3.2.8.2 Reptiles and Amphibians – Field Survey Results

327. Common frogs were occasionally recorded in wet habitats along the Proposed Project and in the wider surroundings of the study area (Figure 8.109 to Figure 8.212). Smooth newt efts were recorded on one occasion within the WTP site boundary. The efts were recorded in a drainage ditch located to the south of the site in September 2020 (Figure 8.117). A number of common frog tadpoles were also recorded on this date within the same drainage ditch. Drainage ditches and ponds within the Proposed Project provide potential breeding sites for common frog and smooth newt. Although the Proposed Project crosses several watercourses and peatland habitats, wetland habitats were generally avoided by the Proposed Project.

328. No common lizard were recorded during field surveys, however suitable habitats for this species were identified, including wet heath, scrub, peatland, grasslands and stone walls.
329. No other reptile or amphibian species were recorded within the study area during field surveys.

8.3.3 Aquatic Ecology

330. The study area (as described in Section 8.2.2) baseline is discussed in the following sections in terms of potentially affected catchments, designated areas of nature conservation with aquatic dependent key conservation interests, water body types in the study area, protected aquatic flora and fauna, fish communities and fisheries, aquatic macroinvertebrates and biological water quality, and aquatic plant communities. Appendix A8.14 (Watercourse Crossing Data) presents the results of the RHAT assessment, macroinvertebrate surveys, biological water quality, and fisheries assessment.
331. This section describes the ecological baseline as it relates to information identified as part of the desktop review and the results of field surveys, under the following headings:
- Aquatic Habitats and Plant Communities (Section 8.3.3.1)
 - Aquatic Macroinvertebrates (Section 8.3.3.2)
 - Protected Aquatic Species (Section 8.3.3.3 to Section 8.3.3.6)
 - Atlantic salmon
 - Freshwater pearl mussel
 - White-clawed crayfish
 - Lamprey species
 - Fishery Value (Section 8.3.3.8)
 - Invasive Non-Native Aquatic Species (Section 8.3.3.9).

8.3.3.1 Aquatic Habitats and Plant Communities

8.3.3.1.1 Aquatic Habitats and Plant Communities – Desktop Review Results

8.3.3.1.1.1 Catchments

332. Ireland continues to be defined as a single river basin district, i.e. the Irish River Basin District under the third cycle of the River Basin Management Plan 2022 – 2027 (DHLGH 2024). Ireland has been divided up into 46 large catchments, 583 subcatchments and 4,829 smaller water bodies. A brief overview of the seven catchments potentially affected by the Proposed Project is provided herein (Figure 8.1).
333. The Lower Shannon Catchments 25D and 25C cover an area of 1,820km² and include Lough Derg and Parteen Basin in their catchment areas. Combined, they have 21 major tributary subcatchments. The area 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 south-east, the Slieve Aughty Mountains in the west and the Slieve Bearnagh and Arra Mountains in the south, between which the Shannon flows to the south from Lough Derg. These catchments can be divided into two regions, the area draining into the western and eastern sides of Lough Derg. The Shannon flows out of Lough Derg through the steep-sided gap between the Slieve Bearnagh and Arra Mountains where the towns of Ballina and Killaloe are located on the east and west banks of the river respectively. Approximately 14.7km of the Proposed Project traverses the Lower Shannon Catchment 25D and 26km traverses the Lower Shannon Catchment 25C.

334. The Lower Shannon Catchment 25B covers an area of 982km² with seven subcatchments. It is characterised by a wide flat plain underlain by mostly impure limestones with a band of purer karstified limestone running from Fivealley to Ballingarry and an upland region in the east comprising the western slopes of the Slieve Bloom Mountains and the low hills to the south-west of Roscrea. There are extensive sand and gravel deposits around Roscrea and Birr that form productive groundwater aquifers. Approximately 32.4km of the Proposed Project traverses the Lower Shannon Catchment 25B.
335. The Lower Shannon Catchment 25A covers an area of 1,248km² and is characterised by relatively flat topography with much of the low-lying areas in the catchment covered in thick deposits of peat. The majority of the catchment is underlain by impure limestones with some purer karstified limestones located from Tyrrellspass, County Westmeath to Kilcormac, County Offaly. There are extensive sand and gravel deposits running through the catchment from Moate, County Westmeath to Tyrrellspass and in isolated pockets in the south of the catchment that form productive groundwater aquifers. The southern tip of the catchment comprising part of the Slieve Bloom Mountains is underlain by old red sandstones. Approximately 32.1km of the Proposed Project traverses the Lower Shannon Catchment 25A.
336. The Barrow Catchment includes the area drained by the River Barrow upstream of the River Nore confluence and all streams entering tidal water between the Barrow railway bridge at Great Island and Ringwood, County Kilkenny. It contains 20 subcatchments and drains a total area of 3,025km². The Barrow catchment is underlain in its flat northern area by limestones of varying purity which continue down the western side of the catchment and sustain good groundwater resources in places. On the eastern side of the catchment, granites dominate, culminating in the summits of the Blackstairs Mountains. Approximately 34.6km of the Proposed Project traverses the Barrow Catchment.
337. A small section of the Proposed Project (approximately 10km) traverses the Boyne Catchment. This catchment includes the area drained by the River Boyne and by all streams entering tidal water between The Haven and Mornington Point, County Meath, draining a total area of 2,694km² which is divided into 20 subcatchments. The Boyne Catchment is characterised by an undulating landscape in the south which changes to a more hummocky, drumlin topography (steep-sided, lenticular hills) in the north. The catchment is underlain by metamorphic rocks in the north and limestone bedrock in the centre and south of the catchment. There are extensive sand and gravel areas in this catchment, particularly along the upper reaches of the Boyne.
338. The Liffey and Dublin Bay Catchment includes the area drained by the River Liffey and by all streams entering tidal water between Sea Mount and Sorrento Point, County Dublin, draining a total area of 1,616km² which is divided into 17 subcatchments. The Liffey catchment contains the largest population of any catchment in Ireland and is characterised by a sparsely populated, upland south-eastern area underlain by granites and a densely populated, flat, low-lying limestone area over the remainder of the catchment basin. Approximately 21.6km of the Proposed Project traverses the Liffey and Dublin Bay Catchment.

8.3.3.1.2 Plant Communities

339. The plants characteristic of the Annex I habitat 'Water courses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation' include a number of *Ranunculus* species and all *Callitriche* species, including other submerged aquatic plants. The community *Callitriche-Batrachion* includes species of the *Ranunculus* subgenus *Batrachium* and two species of water starwort (*Callitriche*), *C. hamulata* and *C. platycarpa* as diagnostic species. There are few published records for descriptions of this habitat in Ireland and no comprehensive Ireland-wide descriptions. According to NPWS (2019b), the EU definition of this habitat is very broad, especially when the presence of aquatic mosses is taken into account. Using this broad definition, the habitat would be found in most watercourses in Ireland. There is to date no accepted definition of the habitat and its sub-types or their distribution in Ireland. Consequently, there is a lack of relevant monitoring data concerning the habitat.

What is clear is that the habitat can occur over a wide range of physical conditions, from acid, oligotrophic, flashy upland streams dominated by bryophytes to more eutrophic, slow-flowing streams dominated by *Ranunculus* and *Callitriche* species. While the former would be sensitive to diffuse pollution, the latter, especially in shallow streams, would be relatively more resistant. The habitat 'Water courses of plain to montane levels with the *Ranunculon fluitantis* and *Callitricho-Batrachion* vegetation' in Ireland has been recently assessed as being 'inadequate' by NPWS in the 2019 Article 17 Conservation Status Assessments (NPWS 2019b). Flora associated with the Annex I habitat 'Water courses of plain to montane levels with the *Ranunculon fluitantis* and *Callitricho-Batrachion* vegetation' (3260) includes:

- Thread-leaved water-crowfoot (*Ranunculus trichophyllus*)
- River water-crowfoot (*Ranunculus fluitans*)
- *Ranunculus penicillatus* subsp. *Penicillatus*
- Stream water-crowfoot (*Ranunculus penicillatus* subsp. *pseudofluitans*)
- Common water-crowfoot (*Ranunculus aquatilis*)
- Water milfoil (*Myriophyllum* spp.)
- Water starwort species (*Callitriche* spp.)
- Lesser water-parsnip (*Berula erecta*)
- Horned pondweed (*Zannichellia palustris*), pondweed species (*Potamogeton* spp.)
- Greater water-moss (*Fontinalis antipyretica*).

340. Opposite leaved pondweed is also included in the list. The flowering rush (*Butomus umbellatus*) may be present as part of the bank flora where floating river vegetation has been identified.

8.3.3.1.1.3 Freshwater Ecological Value

341. The freshwater ecological value of the watercourses crossed by the Proposed Project ranged from low and 'unlikely to support important fish stocks' to high and 'very likely to support important fish stocks' (Appendix A8.14: Watercourse Crossing Data). In general, the larger rivers and streams were found to be of higher ecological value and supported (or had the potential to support) a number of important aquatic species such as Atlantic salmon, lamprey sp., and white-clawed crayfish. The smaller drains and ditches were generally of low freshwater ecological value and were often dry and/or heavily vegetated with limited potential to support protected aquatic species. The ecological valuation of these watercourses and identification of KERs is presented in Table 8.52.

342. In Lough Derg, algae blooms caused by blue-green algae known as cyanobacteria, are known to occur, most recently in 2025. These blue-green algae can evolve to produce toxins from a non-toxic state under certain environmental conditions. Blue-green algae tend to develop populations relatively slowly during the year, they may appear in low numbers during the late spring, evolving during the summer to peak in late summer and early autumn. Populations develop under long periods of stable weather and nutrient supply, especially in accordance with the availability of nitrogen and phosphorus (Touzet 2007). Increased algal growth rate can result in an increased demand for resources such as oxygen in the water body (Taylor *et al.* 2025). This often leads to an intense reduction in oxygen in the environment. These oxygen-starved conditions are known as anoxic conditions and are frequently associated with the mortality of fish and other aquatic biota reliant on oxygen from the water. Thus, such algae blooms may have an impact on the freshwater ecological value of Lough Derg and downstream in Parteen Basin. The ecological valuation of Parteen Basin is presented in Table 8.52.

8.3.3.1.2 *Aquatic Habitats and Plant Communities – Field Survey Results*

343. Figure 8.4 to Figure 8.108 show the water bodies within or crossed by the Proposed Project. These water bodies correspond with rivers, streams, drains, and reservoirs, as shown on the EPA map viewer where spatial data such as watercourse locations can be downloaded from the EPA geoportal website (EPA 2025). These water bodies are also indicated on 1:50,000 scale Discovery Series maps (Ordnance Survey Ireland n.d.). Additional streams and drains not mapped by the EPA are also shown in Figure 8.4 to Figure 8.108. All EPA mapped water bodies (88 in total) within or crossed by the Proposed Project were selected for detailed assessment during the optimal survey seasons between 2016 and 2024. Additional watercourses not mapped by the EPA (mainly drainage ditches) that were identified during the multidisciplinary walkover or aquatic ecology surveys were also surveyed and recorded during this period and have been included in this assessment. Of the 639 watercourse crossings identified within the Proposed Project (Appendix A8.14: Watercourse Crossing Data), 390 are within the Lower Shannon catchment, 133 are in the Barrow catchment, 33 are in the Boyne catchment, and 83 are in the Liffey and Dublin Bay catchment.
344. Water bodies in the study area are discussed below in order of frequency with which they occur, under drains (FW4), eroding/upland rivers (FW1), depositing/lowland rivers (FW2), canals (FW3), and reservoirs (FL7). These are the only aquatic habitat types identified in the study area following the classifications given in Fossitt (2000). The Nenagh River, River Liffey (fifth and sixth order, respectively) and the Grand Canal are the largest watercourses crossed by the Proposed Project. Other relatively large fourth-order watercourses crossed by the Proposed Project include Little Brosna River, Silver River, Clodiagh River, and Figile River. The remaining watercourses crossed by the development are smaller streams and drainage channels.

8.3.3.1.2.1 *Drains (FW4)*

345. In total, 546 of the 639 identified watercourse crossings are highly modified water bodies which correspond with the habitat type 'Drainage Ditch' (FW4). These water bodies include drainage ditches, field drains and channelised streams. Five hundred and thirty two of these have not been identified by the EPA, i.e. they are unknown or smaller than first-order watercourses.
346. Typical characteristics of the water bodies classified as drains included evidence of significant modification, including deepening and straightening, absence of any visible flow, dominance of mud or silt substrate, and dense aquatic vegetation. This category of water body is highly modified, or altogether artificial, and generally of limited aquatic ecological importance, 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. These watercourses usually contain populations of three-spined stickleback (*Gasterosteus aculeatus*) and minnow (*Phoxinus phoxinus*); however, these fish species can be expected to occur in most of the watercourses in the study area. Minnow and stickleback were recorded at several of the watercourse crossings throughout the Proposed Project (Appendix A8.14: Watercourse Crossing Data).
347. Drainage ditches in the study area were generally evaluated as being of local importance (lower value). It is noted that these water bodies can be of importance to amphibians (i.e. frogs and newts) and the presence of frogs and/or newts would raise their overall ecological value. Common frog were observed during aquatic ecology surveys at several drainage ditches along the Proposed Project (Figure 8.109 to Figure 8.212).

348. It is also possible that Desmoulin's whorl snail, which prefers fens and marshes bordering rivers, canals, lakes and ponds, could use these habitats in some limited areas, although there are no known records of this species within 850m of the Proposed Project. The majority of drains recorded within the Proposed Project were physically degraded and organically enriched and none were considered suitable habitat for *Vertigo* species.
349. Small drains can also occasionally be used by white-clawed crayfish. However, none were recorded in any of the FW4 drainage ditches during the aquatic ecology surveys, but suitable habitat was noted at ten (PSNWBX010, WBX039, WBX057, WBX058, WBX062, WBX092, WBX094, WBX097, WCX034, WCX035). Potential juvenile lamprey habitat was recorded at 18 of the drainage ditch crossings, while the presence of juvenile lamprey was noted at four (WBX001, WBX002, WBX034 and WCX010). Potential salmonid habitat was recorded at 14 of the drainage ditch crossings, and the presence of brown trout was noted at one of the crossings (WBX034) (Appendix A8.14: Watercourse Crossing Data).
350. The drainage ditches in the study area which did not support any protected species, and which were identified as having limited ecological value, were assigned as being of local importance (lower value). However, the drainages ditches which contained evidence of protected aquatic species (e.g. lamprey, salmon, common frog) were assigned local importance (higher value) and in some cases county importance due to their ecological value.

8.3.3.1.2.2 Eroding/upland Rivers (FW1)

351. The Proposed Project crosses a total of 29 watercourses which have been categorised as 'Eroding/upland Rivers' (FW1). The majority of these watercourses have been identified and named by the EPA, while nine of these were found to be unmapped rivers. The following species were recorded in one or more of the watercourses: three-spined stickleback, brook lamprey, brown trout, minnow, white-clawed crayfish, and lamprey sp.
352. During aquatic surveys between 2016 and 2024, white-clawed crayfish were noted within the Rock [Birr] Stream (WCX027). Lamprey sp. were noted on four occasions: at two locations in the Knockadromin Stream (WCX002 and WCX004), Rock [Birr] stream (WCX027) and in Clareen Stream (WCX029). Brown trout were recorded in the Knockadromin Stream (WCX004) in a tributary of the Kilmastulla River (WCX005), in the Clareen Stream (WCX029) and in an unmapped river at WBX027.
353. It is assumed species listed in Annex II of the Habitats Directive (such as white-clawed crayfish (dependent on water chemistry) and lamprey sp., (particularly brook lamprey, due to the Proposed Project's distance from the sea and barriers for sea and river lamprey)) or species protected under the Wildlife Acts, could occur in eroding/upland rivers. Therefore, eroding/upland rivers in the study area are evaluated based on their ecological value (Table 8.52).

8.3.3.1.2.3 Depositing/lowland Rivers (FW2)

354. Of the 639 proposed watercourse crossings, 60 of these are depositing/lowland rivers. The larger FW2 water bodies (fourth order or greater) include: Lower River Shannon, Kilmastulla River, Nenagh River, Little Brosna River, Silver River, Clodiagh River, Figile River and the River Liffey.
355. These watercourses are typically low gradient with deposits of fine sediments on the riverbed with slow water flow. Such reaches of these watercourses would generally hold populations of small fish such as minnow, stone loach, pike (*Esox lucius*), perch (*Perca fluviatilis*) and brown trout. Atlantic salmon, river and sea lamprey, and white-clawed crayfish could also potentially be present in these stretches. During the aquatic surveys between 2016 and 2024 the following aquatic fauna were recorded in one or more FW2 water bodies; brown trout, stone loach (*Barbatula barbatula*), stickleback sp., Atlantic salmon, lamprey sp., minnow, roach and crayfish (Appendix A8.14: Watercourse Crossing Data).

356. Crayfish were noted in the Ardgregane Stream (WCX013), Silver [Kilcormac] River (WCX036), the Clodiagh [Tullamore] Stream (WCX039), the River Liffey (WCX073) and the Reeves Stream (WXC074). Lamprey species were recorded within the Ardgregane Stream (WCX013), the Ballyfinboy Stream (WCX021), the Breaghmore River (WCX031), the Camcor River (WCX032), the Silver [Kilcormac] River (WCX036), the Clodiagh [Tullamore] River (WCX039) and the Kilmastulla River (WCX077). Salmonids were recorded in the Blackwater (Clare) River (PSNWCX002), the Ardgregane Stream (WCX012 and WCX013), the Nenagh River (WCX016), the Ballyfinboy River (WCX021), the Clareen Stream (WCX028), the Camcor River (WCX031 and WCX032), the Clodiagh [Tullamore] River (WCX039), the Daingean River (WCX048), the Figile River (WCX056), the River Liffey (WCX073) and the Kilmastulla River (WCX077). The lowland depositing rivers in the study area are evaluated based on their ecological value (Table 8.52).
357. The larger FW2 water bodies and/or the FW2 water bodies ranked as being of 'high ecological value' (see Appendix A8.14: Watercourse Crossing Data) and very likely to support important fish stocks, would be crossed by trenchless excavation (Chapter 5: Construction & Commissioning). The locations for drill rig positioning and the launch and reception shafts would be chosen or engineered such that the fall is away from the water body, thereby facilitating installation of pollution containment and control facilities, in accordance with the 'Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters' (IFI 2016), or as otherwise agreed with IFI during the Construction Phase.

8.3.3.1.2.4 Canals (FW3)

358. As mentioned, the Proposed Project crosses the Grand Canal on three occasions: twice at Kilpatrick, County Kildare near Chainage TWD – 15100 (Figure 8.89; note, one of the two (WBX109) is for access only and would not require any works) and at Colganstown, County Dublin near Chainage TWE – 14200 (Figure 8.106). The Grand Canal is designated as an Artificial Water Body by the River Basin Management Plan 2022 – 2027. At all crossing points the canal is highly modified, channelised, and linear, with steep vertical banks approximately 1m to 2m high at Kilpatrick and 2m to 3m high at Colganstown. The wetted width ranged from approximately 10m to 12m at all sites. The riparian zone at both crossing points consisted of a grass verge, a gravel towpath and a deciduous treeline. The second crossing at Kilpatrick is an access and egress point for tunnelling equipment to gain access into the Construction Working Width and would use the existing canal bridge (Figure 8.90).
359. There are no known records of rare or protected species at the Colganstown crossing and no protected species were recorded during surveys between 2016 and 2024. However, the following protected aquatic species have been recorded within the 10km square grid (N93) in which the proposed crossing lies: smooth newt, common frog, white-clawed crayfish, Desmoulin's whorl snail, and narrow-mouthed whorl snail. Vascular plants recorded along the water's edge and in the canal during field surveys included arrowhead, reed sweet-grass (*Glyceria maxima*), rushes, and broad-leaved pondweed (*Potamogeton natans*).
360. At the Kilpatrick crossing there are also no known records of rare or protected species; however, opposite-leaved pondweed (FPO and Red Listed species) was recorded at the crossing during field surveys in August 2017. The following protected aquatic species have also been recorded within the 10km square grid (N72) in which the proposed crossing lies: smooth newt, common frog, white-clawed crayfish, opposite-leaved pondweed, and Desmoulin's whorl snail. Vascular plants recorded along the water's edge and in the canal during field surveys at this site included broad-leaved pondweed, fool's watercress (*Apium nodiflorum*), and water-plantain (*Alisma plantago-aquatica*).

361. Similar to the majority of lowland rivers, the main channel of the Grand Canal at WBX078 and WBX088, would be crossed by trenchless excavation which would prevent the disruption to aquatic habitats. Using this technique, there would be no significant effects on the hydrology, water quality or geomorphology of the watercourse being crossed. Again, the locations for drill rig positioning and pipeline pull areas would be chosen or engineered such that the fall is away from the water body (IFI 2016), or as otherwise agreed with IFI during the Construction Phase.
362. The Proposed Project also crosses the Ardnacrusha Headrace (PSNWBX005) between polesets 64B and 65B (Figure 8.7), south-west of O'Briensbridge, County Clare. This watercourse would be crossed by the proposed 38 kV Uprate Works, therefore there would be no proposed in-stream works or disruption to aquatic biota at this location.

8.3.3.1.2.5 Reservoirs (FL7)

363. Parteen Basin is a HWMB (a Reservoir (FL7) in accordance with Fossitt (2000)), which was developed as part of the Shannon Hydroelectric Scheme constructed between 1925 and 1929 where the old course of the River Shannon between Parteen Weir and Ballina/Killaloe was flooded. The engineering embankments on the east and west sides, and the Parteen Weir, retain the water in the impoundment. The Parteen regulating weir, located to the east of the entrance to the Headrace, serves to divert the main fraction of the average flow of the River Shannon to the power station. Parteen Basin immediately upstream of the regulating weir provides supplementary impounded water and extends upstream as far as the narrow channel between Ballina and Killaloe. As mentioned, the proposed Raw Water Abstraction is located at the north end of the Fort Henry Embankment in the townland of Garrynatineel. The proposed layout of the RWI&PS is shown in Figure 4.61. The site is currently a mixed deciduous conifer woodland (WD2) with occasional willow along the shoreline (Appendix A8.2: Assessment of the Woodland Near Parteen Weir). Parteen Basin and the RWI&PS site is located within the Lower River Shannon SAC.
364. The shore within the proposed Raw Water Abstraction is gently shelving with the upper shore comprising cobble and gravel. This profile is relatively uniform both upstream and downstream of the Raw Water Intake 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 (Appendix A8.19: Aquatic Invasive Species Survey Report).

8.3.3.1.2.6 Plant Communities

365. Plants recorded along the Proposed Project watercourse crossings between 2016 and 2024 included (Table 8.40):
- Water milfoil
 - Common water-crowfoot
 - Branched bur-reed (*Sparganium erectum*)
 - Yellow flag iris (*Iris pseudacorus*)
 - Watercress (*Nasturtium officinale*)
 - Duckweeds (*Lemna* sp.)
 - Fool's watercress (*Helosciadium nodiflorum*)
 - Reed grass (*Phragmites* sp.)
 - Sweet-grasses (*Glyceria* sp.)
 - Meadowsweet (*Filipendula ulmaria*)

- Water mint (*Mentha aquatica*)
- Marsh bedstraw (*Galium palustre*)
- Bulrush (*Typha latifolia*)
- Common horsetail (*Equisetum arvense*)
- Common water-plantain (*Alisma plantago-aquatica*)
- Water forget-me-not (*Myosotis scorpioides*)
- Pondweed species
- Marsh marigold (*Caltha palustris*)
- Brooklime (*Veronica beccabunga*)
- Club rush (*Schoenoplectus lacustris*)
- New Zealand pigmyweed (*Crassula helmsii*)
- Common starwort (*Callitriche stagnalis*)
- Water speedwell (*Veronica anagallis-aquatica*)
- Amphibious bistort (*Persicaria amphibia*)
- Reed Canary-grass (*Phalaris arundaceae*)
- Lesser spearwort (*Ranunculus flammula*)
- Ivy-leaved crowfoot (*Ranunculus hederaceus*)
- Water starwort (*Callitriche palustris*)
- Narrow-leaved water plantain (*Alisma lanceolatum*)
- Water lilies (*Nymphaeaceae* sp.).

366. Filamentous green algae was also common in many of the enriched lower reaches of rivers and some tributaries within the study area. Occasionally non-aquatic plant species were recorded in channels that were dry at the time of the survey but are still noted under 'in-stream vegetation' in Table 8.40.

367. At the proposed RWI&PS site at Parteen Basin, 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. From 2019 onwards, a moderate amount of algal cover was noted which was not evident during the 2017 scuba survey. Greater water-moss was present, though primarily confined to the roots of fringing trees that are exposed on the lake shore. In water from 1.0 to 1.5m in depth, small amounts of stonewort are 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. In water from 1.5m to 2.5m in depth, both bulrush and arrowhead formed dense stands with occasional clumps of yellow waterlily. The bulrush formed emergent reedbeds while the arrowhead remained in submerged form. Both dominant species thinned out towards 3.0m depth and small amounts of ivy-leaved duckweed occurred on the lakebed. No macrophytes were recorded below 3.5m (euphotic depth) (Appendix A8.17: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2017), Appendix A8.18: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2019), and Appendix A8.23: Aquatic Invasive Species and Macrophyte Survey at Lough Derg and Parteen Basin).

368. A larger area of fringe habitats (mainly reedbeds) occur along the western edge of Parteen Basin, compared with the eastern area. The reduced coverage of such habitats along the eastern shore is due largely to a combination of maintenance works and the relatively steep drop from the embankment into the water on this side of the basin. Strips of woodland are present along the north-east of Parteen Basin (north of the retaining embankment) as far as Ballina and on the western lake edge close to Killaloe (Appendix A8.1: Parteen Habitat Assessment, Appendix A8.2: Assessment of the Woodland Near Parteen Weir, and Appendix A8.4: Target Habitat Surveys Report).

8.3.3.2 Aquatic Macroinvertebrates

8.3.3.2.1 Aquatic Macroinvertebrates – Desktop Review Results

369. Macroinvertebrates are bioindicators; their presence in a body of water will give an overall view of the quality of the water and the ecosystem. A NBDC review of aquatic macroinvertebrate data within the 10km grid squares encompassing the Proposed Project was undertaken. Various species were present in a number of locations surrounding the Proposed Project. The majority included caddis fly, mayfly, stonefly and true fly species, as well as various mollusc species. These species were also the highest recorded in the national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007–2018 (Feeley *et al.* 2020).

8.3.3.2.2 Aquatic Macroinvertebrates – Field Survey Results

370. Macroinvertebrate assemblages were recorded in 52 of the watercourses surveyed between 2016 and 2024 (Section 8.2.5.2.2 and Appendix A8.14: Watercourse Crossing Data). Note, visual assessments only were undertaken during multidisciplinary surveys in 2025. The list of macroinvertebrates recorded at these locations are provided in Table 8.40. Many sites could not be kick sampled due to unsuitable conditions for kick sampling (e.g. peat substrate), dry and/or heavily vegetated watercourses, or access restrictions (e.g. too deep to safely wade, or fenced off, or surrounded by thick vegetation). Watercourse morphology including physical characteristics such as depth and wetted width, as well as gradient, substrate conditions and in-stream/emergent vegetation coupled with water quality, all dictate macroinvertebrate communities and relative abundance. Pollution tolerant macroinvertebrates were found to dominate the macroinvertebrate assemblage at most sites. The larger watercourses were not sampled as they were too deep to kick sample, however in general these sites are likely to support the richest aquatic macroinvertebrate communities in the Proposed Project. Smaller watercourses (drainage ditches, as opposed to small streams) within the Proposed Project are prone to fluctuations and generally have less biodiversity.
371. Across the 52 watercourses where sampling was carried out, macroinvertebrate diversity was generally low with nine or fewer taxa identified at each location. The Clodiagh River (WCX039) and the Meelaghans River (WCX042), County Offaly had the highest number of taxa which included a number of mayfly, stonefly and crustacean species. The relatively tolerant but acid-sensitive families Baetidae and Gammaridae were present at the majority of sites sampled and were often common and sometimes dominant.
372. A benthic invertebrate survey was also carried out at Parteen Basin in August 2016 to determine the baseline scenario (Section 8.2.5.2.2). In total, 34 taxa were recorded, many of which were as single individuals at a small number of sites. The most abundant species recorded was the INNS zebra mussel, which occurred at 10 out of the 12 stations, with the highest count of individuals (992) recorded at Station PB10. Station PB12 returned the lowest number of different species (2), while Station PB2 returned the highest (13).

373. As mentioned, the highest number of individuals (992) was recorded at Station PB10, while the lowest number of individuals (10) was recorded at Station PB4 (Image 8.1). No unusual macroinvertebrate species were recorded in Parteen Basin. The cluster analysis performed on the data shows there are two main groups of samples comprising Station 1-7 and Station 11 and 12 (Cluster A) that separate from the three remaining stations, Stations 8, 9 and 10 (Cluster B) at a similarity level of 20%. The top three characterising species in Cluster A were *Chironomidae* sp., *Limnodrilus* sp. and *Spirosperma ferox*, while the top three species in Cluster B were *Asellus aquaticus*, *Dreissena polymorpha* and *Dendrocoelum lacteum*. As noted in Section 8.2.5.2.2, this survey was not repeated, and instead scuba surveys were undertaken at the RWI&PS site in 2017, 2019, 2021 and 2024.
374. The only protected macroinvertebrate recorded in the study area was white-clawed crayfish. This species was recorded on six occasions during surveys undertaken between 2016 and 2024 and is likely to occur in several watercourses crossed by the Proposed Project, where suitable habitat exists.

Table 8.40: In-stream Vegetation and Macroinvertebrates Recorded at the Proposed Project Watercourse Crossings During Aquatic Surveys between 2016 and 2024

Water Body Crossing ID	Figure Reference	Category	Watercourse Name	EPA Name	EPA Code	Catchment	Q-Value ¹	EPA Status	In-stream Vegetation ²	Benthic Invertebrates
WBX001	Figure 8.11	FW4	—	Drain	NA	Lower Shannon	Q2-Q3 (2021)	NA	—	2021: <i>Gammarus</i> sp., <i>Asellus</i> sp., large dark olive mayfly (<i>Baetis rhodani</i>) 2024: No land access for 2024 surveys
WBX002	Figure 8.11	FW4	—	Drain	NA	Lower Shannon	Q2-Q3 (2019)	NA	—	2019: <i>Gammarus</i> sp., <i>Asellus</i> sp., large dark olive mayfly 2024: No land access for 2024 surveys
WBX008	Figure 8.14	FW1	—	Drain	NA	Lower Shannon	Q3 (2020) Q3-Q4 (2024)	NA	—	2020: <i>Gammarus</i> sp. 2024: <i>Gammarus</i> sp. caseless caddis, water louse, stonefly
WBX010	Figure 8.14	FW4	—	Drain	NA	Lower Shannon	Q3 (2024)	NA	—	2024: <i>Gammarus</i> sp.
WBX012	Figure 8.15	FW4	—	Drain	NA	Lower Shannon	Q3 (2020 and 2024)	NA	—	2020: <i>Gammarus</i> sp., large dark olive mayfly, and Simuliidae 2024: <i>Gammarus</i> sp., Great diving beetle (<i>Dytiscus marginalis</i>), <i>Aesellus</i> sp.
WBX023	Figure 8.36	FW4	—	Drain	NA	Lower Shannon	Q2-Q3 (2024)	NA	—	2024: <i>Gammarus</i> sp., beetle larvae, water louse, Chironomid, <i>Beraeidae</i> sp.
WBX025	Figure 8.38	FW4	—	Drain	NA	Lower Shannon	Q3-Q4 (2020)	NA	Fool's watercress, watermint	2020: <i>Gammarus</i> sp., Simuliidae and Oligochaeta. 2024: Not suitable for kick sampling, only shallow patches of water present.
WBX027	Figure 8.40	FW1	—	Drain	NA	Lower Shannon	Q3 (2019)	NA	—	2019: <i>Gammarus</i> sp., large dark olive mayfly, Chironomid and leech. 2024: Not suitable for kick sampling, banks unsafe for entry with dense vegetation.
WBX034	Figure 8.46	FW4	—	Drain	NA	Lower Shannon	Q3 (2020)	NA	Fool's watercress	2020: <i>Gammarus</i> sp., caddis case (<i>Drusus annulatus</i>), cased caddis, Chironomid, riffle beetle, mud snail. 2024: Not suitable for kick sampling, water levels too deep.
PSNWCX001	Figure 8.4	FW2	BLACKWATER (CLARE)_020 (IE_SH_25B0 60250)	Glenlon South	25_3882	Lower Shannon	Q3 (2022)	Moderate	—	2022: <i>Gammarus</i> sp., Great diving beetle larvae, <i>Drusus annulatus</i> , <i>Baetis</i> sp., <i>Beraeidae</i> sp., Chironomid, caseless cadis and stone fly. 2024: No land access for 2024 surveys.

Water Body Crossing ID	Figure Reference	Category	Watercourse Name	EPA Name	EPA Code	Catchment	Q-Value ¹	EPA Status	In-stream Vegetation ²	Benthic Invertebrates
PSNWCX002	Figure 8.4	FW2	BLACKWATER (CLARE)_020 (IE_SH_25B0 60250)	Blackwater (Clare)	25_3885	Lower Shannon	Q3-Q4 (2022 and 2024)	Moderate	—	2022: <i>Gammarus</i> sp., <i>Baetis</i> sp., <i>Ecdyonurus dispar</i> , Caseless caddis, <i>Goeridae</i> , riffle beetle, <i>Dytiscid</i> (unknown species). 2024: <i>Ecdyonurus</i> sp., <i>Baetis</i> sp., <i>Gammarus</i> , <i>Serratella</i> , Chironomid, cased caddis.
PSNWCX003	Figure 8.5	FW1	BLACKWATER (CLARE)_020 (IE_SH_25B0 60250)	Oakfield 25	25_3884	Lower Shannon	Q2-Q3 (2024)	Moderate	Common Starwort	2024: Chironomid, red blood worm (<i>Glycera</i> sp.), <i>Gammarus</i> sp., waterlouse (<i>Asellus aquaticus</i>).
WCX001	Figure 8.12	FW2	KILMASTULL A_050 (IE_SH_25K0 41000)	Kilmastulla	25_1970	Lower Shannon	Q4 (2020)	Moderate	—	2020: <i>Gammarus</i> sp., large dark olive mayfly and <i>Ecdyonurus</i> sp. 2024: Not suitable for kick sampling, banks unsafe for entry.
WCX002	Figure 8.12	FW1	KILMASTULL A_050 (IE_SH_25K0 41000)	Knockadrom in	25_783	Lower Shannon	Q4 (2020) Q4 (2022) Q4 (2024)	Moderate	Marsh marigold, brooklime	2020: <i>Gammarus</i> sp., large dark olive mayfly, <i>Oligochaeta</i> , <i>Ecdyonurus</i> sp., flattened mayflies and uncased caddis. 2022: <i>Gammarus</i> sp., <i>Ecdyonurus</i> sp., riffle beetle, <i>Amphinemura sulcicollis</i> , <i>Baetis</i> sp., blue-winged olive mayfly (<i>Serratella ignita</i>), <i>Rhyacophila dorsalis</i> and cased caddis. 2024: <i>Serratella</i> , <i>Ecdyonurus</i> sp., <i>Baetis</i> sp., brown needle stonefly.
WCX003	Figure 8.12	FW1	KILMASTULL A_050 (IE_SH_25K0 41000)	Inchabeg	25_1506	Lower Shannon	Q3 (2018)	Moderate	(Filamentous algae)	2018: <i>Asellus</i> sp., uncased and cased caddis, <i>Gammarus</i> sp. and riffle beetles. 2024: No land access for 2024 surveys.
WCX004	Figure 8.13	FW1	KILMASTULL A_050 (IE_SH_25K0 41000)	Knockadrom in	25_124	Lower Shannon	Q3 (2017, 2018, 2019) Q3-4 (2020)	Moderate	Soft rush, marginal watercress, <i>Veronica</i> sp. (Filamentous algae)	2017: Hepaigeniidae, large dark olive mayfly, Leuctridae and caseless caddis. 2018: <i>Ecdyonurus</i> sp., <i>Perla</i> sp., <i>Gammarus</i> sp. and <i>Hydropsyche</i> sp. 2019: Mayfly, stonefly, <i>Gammarus</i> sp. and <i>Coleoptera</i> sp. 2020: Large dark olive mayfly, beetles and <i>Oligochaeta</i> . 2024: No land access for 2024 surveys.

Water Body Crossing ID	Figure Reference	Category	Watercourse Name	EPA Name	EPA Code	Catchment	Q-Value ¹	EPA Status	In-stream Vegetation ²	Benthic Invertebrates
WCX005	Figure 8.16	FW1	KILMASTULL A_030 (IE_SH_25K0 40800)	NA	25_3631	Lower Shannon	Q3-Q4 (2017 and 2018) Q3 (2019) Q4 (2020, downstream)	Poor	—	2017: <i>Leuctra</i> sp., <i>Goeridae</i> . 2018: <i>Gammarus</i> sp. Dominant. 2019: Oligochaeta, Coleoptera, stonefly, mayfly and <i>Gammarus</i> sp. 2020 (Downstream): <i>Leuctra</i> sp., <i>Gammarus</i> sp., uncased caddis fly, <i>Ecdyonurus</i> sp., <i>simulid</i> , beetle larvae, Oligochaeta and mollusc sp. (recorded downstream of crossing). 2024: No land access for 2024 surveys.
WCX006	Figure 8.17	FW1	KILMASTULL A_020 (IE_SH_25K0 40300)	Gortmore 25	25_2608	Lower Shannon	Q3-Q4 (2017) Q3 (2020 upstream)	Moderate	Marginal watercress	2020 (Upstream): <i>Gammarus</i> sp., and beetle. 2024: No land access for 2024 surveys.
WCX008	Figure 8.18	FW1	KILMASTULL A_020 (IE_SH_25K0 40300)	Mountstack	25_3542	Lower Shannon	Q3 (2017) Q4 (2018) Q3-4 (2020 upstream) Q3 (2022)	Moderate	Fool's watercress, brooklime, watermint	2017: <i>Baetis</i> sp., <i>Gammarus</i> sp., <i>Rhyacophila</i> sp., Elmidae and Naidida. 2018: <i>Gammarus</i> sp. 2020 (upstream): <i>Gammarus</i> sp., large dark olive mayfly, Oligochaeta and Simuliidae. 2022: <i>Gammarus</i> sp., <i>Baetis</i> sp., blue-winged olive mayfly, riffle beetle, caddis casefly, Leptoceridae, Lumbricidae and <i>Eiseniella tetraedra</i> . 2024: No land access for 2024 surveys.
WCX009	Figure 8.18	FW1	KILMASTULL A_020 (IE_SH_25K0 40300)	Cloghleigh	25_3652	Lower Shannon	Q3 (2024)	Moderate	Fool's watercress	2024: <i>Gammarus</i> sp.
WCX010	Figure 8.18	FW4	KILMASTULL A_020 (IE_SH_25K0 40300)	Patrickswell 25	25_969	Lower Shannon	Q3 (2024)	Moderate	—	2024: <i>Gammarus</i> sp.
WCX011	Figure 8.19	FW2	KILMASTULL A_020 (IE_SH_25K0 40300)	Ardgregane Stream	25_3462	Lower Shannon	Q2 (2024)	Poor	Fool's watercress, brooklime	2024: <i>Gammarus</i> sp., Chironomid.

Water Body Crossing ID	Figure Reference	Category	Watercourse Name	EPA Name	EPA Code	Catchment	Q-Value ¹	EPA Status	In-stream Vegetation ²	Benthic Invertebrates
WCX012	Figure 8.20	FW2	ARDGREGAN E STREAM_020 (IE_SH_25A0 40400)	Fatthen	25_1336	Lower Shannon	Q2 (2016) Q3 (2022)	Moderate	Fool's watercress	2016: <i>Baetis</i> sp., <i>Gammarus</i> sp., <i>Tubifex</i> sp., Simuliidae, <i>Elmis</i> sp. and <i>Goera</i> sp. 2022: <i>Gammarus</i> sp., <i>Baetis</i> sp., lesser water boatman (<i>Corixa punctata</i>) and riffle beetle. 2024: No land access for 2024 surveys.
WCX013	Figure 8.21	FW1	ARDGREGAN E STREAM_020 (IE_SH_25A0 40400)	Ardregane Stream	25_1029	Lower Shannon	Q3-Q4 (2016) Q4 (2020) Q2-Q3 (2022) Q2-Q3 (2024)	Moderate	Fool's watercress	2016: <i>Hydropsyche</i> sp., <i>Gammarus</i> sp., <i>Heptagenia</i> sp., <i>Leuctra</i> sp., and <i>Baetis</i> sp. 2019: Not assessed. Too deep as river was flooded. 2020: <i>Gammarus</i> sp., large dark olive mayfly, beetle larvae, uncased caddis, Simuliidae, Oligochaeta. 2022: <i>Gammarus</i> sp., freshwater hog louse, Lumbricidae worm, and Chironomid. 2024: <i>Gammarus</i> sp.
WCX014	Figure 8.22	FW1	ARDGREGAN E STREAM_020 (IE_SH_25A0 40400)	Monsea 25	25_3773	Lower Shannon	Q2 (2024)	Moderate	Flag iris, fool's watercress	2024: Waterlouse, diving beetle.
WCX016	Figure 8.23	FW2	NENAGH_070 (IE_SH_25N0 10800)	Nenagh	25_359	Lower Shannon	Q3 (2018, 2022 and 2024)	Moderate	<i>Ranunculus</i> sp., bur-reed, fool's watercress, reed canary-grass (Filamentous algae)	2018: <i>Gammarus</i> sp., <i>Ecdyonurus</i> sp., and Gastropoda. 2022: Caddis case, caddis larvae, <i>Beatis</i> sp., <i>Gammarus</i> sp., false march brown mayfly (<i>Ecdyonurus venosus</i>), leech and blue-winged olive mayfly. 2024: <i>Beatis</i> sp., <i>Gammarus</i> sp., blue-winged olive mayfly.
WCX020	Figure 8.31	FW4	BALLYFINBOY_040 (IE_SH_25B0 20550)	Ballyfinboy	25_3690	Lower Shannon	Q2 (2024)	Moderate	Flag iris	2024: <i>Asellus</i> sp.
WCX021	Figure 8.31	FW2	BALLYFINBOY_040 (IE_SH_25B0 20550)	Ballyfinboy	25_3690	Lower Shannon	Q3-Q4 (2018) Q3-Q4 (2024)	Moderate	Common reed, fool's watercress	2018: Uncased caddis, <i>Gammarus</i> sp., riffle beetles, large dark olive mayfly, Oligochaeta, Simuliidae and Ephemerellidae. 2024: <i>Gammarus</i> sp., brown needle stonefly, <i>Serratella</i> sp., Chironomid, freshwater louse, damselfly nymph.

Water Body Crossing ID	Figure Reference	Category	Watercourse Name	EPA Name	EPA Code	Catchment	Q-Value ¹	EPA Status	In-stream Vegetation ²	Benthic Invertebrates
WCX024	Figure 8.36	FW1	SHINRONE STREAM_010 (IE_SH_25S1 10100)	Shinrone Stream	25_1069	Lower Shannon	Q1-Q2 (2019) Q2 (2022)	Poor	—	2019: Coleoptera, Oligochaeta and <i>Gammarus</i> sp. 2022: Chironomid and freshwater hog louse. 2024: Not suitable for kick sampling, dry channel.
WCX025	Figure 8.37	FW1	SHINRONE STREAM_010 (IE_SH_25S1 10100)	Quakerstown	25_2665	Lower Shannon	Q3 (2019, 2022 and 2024)	Poor	—	2019: <i>Gammarus</i> sp., Oligochaeta, Simuliidae, and large dark olive mayfly. 2022: <i>Gammarus</i> sp., <i>Baetis</i> sp., blue-winged olive mayfly, freshwater leech, riffle beetle, cased caddis. 2024: <i>Gammarus</i> sp., <i>Beraeidae</i> sp., green olive caseless cadis, riffle beetle.
WCX027	Figure 8.41	FW1	ROCK (BIRR)_010 (IE_SH_25R0 20050)	Rick [Birr]	25_3343	Lower Shannon	Q4 (2017) Q3-Q4 (2020) Q3 (2022) Q3 (2024)	Poor	Fool's watercress, flag iris	2017: Mayfly, stonefly, <i>Gammarus</i> sp., water beetle, Simuliidae and Oligochaeta. 2020: <i>Gammarus</i> sp., Simuliidae, and large dark olive mayfly. 2022: <i>Gammarus</i> sp., cased caddis (unknown sp.), freshwater hog louse and <i>Serratella</i> sp. 2024: <i>Gammarus</i> sp., <i>Baetis</i> sp., beetle larvae, Simuliidae, riffle beetle, <i>Serratella</i> sp.
WCX028	Figure 8.44	FW1	CLAREEN STREAM/FUA RAWN_020 (IE_SH_25C1 30600)	Kilamine 25	25_4	Lower Shannon	Q3 (2017 and 2018) Q3-Q4 (2020) Q3 (2022) Q3 (2024)	Moderate	Water speedwells, brooklime, flag iris, duckweed	2017: <i>Baetis</i> sp., <i>Gammarus</i> sp., Trichoptera, cased and uncased, and Oligochaeta. 2018: Mayfly and <i>Gammarus</i> sp. 2020: <i>Orthocladus</i> sp., caseless caddis (<i>Rhyacophila dorsalis</i>), cased caddis, <i>Gammarus</i> sp., freshwater woodlouse (<i>Asellus aquaticus</i>), stickleback, iron blue mayfly (<i>Alainites muticus</i>) and margined ramshorn snail (<i>Planorbis planorbis</i>). 2022: <i>Gammarus</i> sp. and cased caddis (too calcified to identify). 2024: <i>Gammarus</i> , riffle beetle <i>Baetis</i> sp.

Water Body Crossing ID	Figure Reference	Category	Watercourse Name	EPA Name	EPA Code	Catchment	Q-Value ¹	EPA Status	In-stream Vegetation ²	Benthic Invertebrates
WCX029	Figure 8.45	FW1	CLAREEN STREAM/FUA RAWN_020 (IE_SH_25C1 30600)	Clareen Stream	25_627	Lower Shannon	Q3 (2017) Q4 (2020) Q3 (2022) Q3 (2024)	Moderate	Brooklime, flag iris, watermint	2017: <i>Baetis</i> sp., <i>Gammarus</i> sp., and Trichoptera. 2020: Leeches, <i>Gammarus</i> sp., uncased caddis, Simuliidae and riffle beetle. 2022: <i>Gammarus</i> sp., cased caddis (unidentified due to calcification), three spine stickleback, rash diver water beetle (<i>Hygrotus versicolor</i>), lamprey and riffle beetle. 2024: Brown needle stonefly, cased caddis, beetle larvae, green olive mayfly, riffle, beetle, <i>Gammarus</i> sp., <i>Baetis</i> sp., damselfly.
WCX031	Figure 8.45	FW2	CAMCOR_030 (IE_SH_25C0 20500)	Breaghmore	25_3432	Lower Shannon	Q4-5 (2016 and 2022) Q3-Q4 (2024)	Good	—	2016: <i>Baetis</i> sp., Perlidae, Heptageniidae, Leuctra, Simuliidae, <i>Elmis</i> sp., and Trichoptera. 2022: Stonefly, needle fly (<i>Leuctra hippopus</i>), <i>Serratella</i> sp., <i>Baetis</i> sp., riffle beetle, <i>Gammarus</i> sp., great diving beetle and false march brown. 2024: <i>Plecoptera</i> sp., <i>Baetis</i> sp., <i>Gammarus</i> sp., riffle beetle, <i>Ecdyonurus</i> sp., Chironomid, beetle larvae.
WCX032	Figure 8.46	FW2	CAMCOR_030 (IE_SH_25C0 20500)	Camcor	25_2084	Lower Shannon	Q4-Q5 (2017) Q3-Q4 (2024)	Good	—	2017: Stonefly, mayfly <i>Gammarus</i> sp., uncased caddis, Oligochaeta, shell of freshwater limpet. 2024: <i>Baetis</i> sp., <i>Gammarus</i> sp., <i>Plecoptera</i> sp., Brown needle stonefly, riffle beetle, <i>Ecdyonurus</i> sp., Simuliidae, midget larvae.

Water Body Crossing ID	Figure Reference	Category	Watercourse Name	EPA Name	EPA Code	Catchment	Q-Value ¹	EPA Status	In-stream Vegetation ²	Benthic Invertebrates
WCX036	Figure 8.59	FW2	SILVER (KILCORMAC)_020 (IE_SH_25S0 20200)	Silver [Kilcormac]	25_2974	Lower Shannon	Q3-Q4 (2019) Q3 (2017 and 2018) Q4 (2020 downstream) Q4 (2022) Q3-Q4 (2024)	Good	—	2017: <i>Gammarus</i> sp., <i>Baetis</i> sp., Simuliidae, uncased Trichoptera and Hirudinae. 2018: <i>Gammarus</i> sp., <i>Baetis</i> sp., Simuliidae, Oligochaeta, Heptageniidae and cased caddisfly. 2019: Mayfly, caddisfly, leech, <i>Gammarus</i> sp., Coleoptera, Oligochaeta and midge larva. 2020 (downstream): <i>Ecdyonurus dispar</i>, large dark olive mayfly and crayfish. 2022: <i>Baetis</i> sp., blue-winged olive mayfly, <i>Gammarus</i> sp., riffle beetle and cased caddis. 2024: <i>Serratella</i> sp., <i>Baetis</i> sp., caseless caddis, <i>Gammarus</i> sp., <i>Perlidae</i> sp., brown needle stonefly.
WCX038	Figure 8.59	FW4	SILVER (KILCORMAC)_020 (IE_SH_25S0 20200)	House Derries	25_3148	Lower Shannon	Q2 (2020)	Good	Common water crowfoot, brooklime, watermint	2020: Freshwater snail, bloodworm, freshwater louse. 2024: Not suitable for kick sampling, dry channel.
WCX039	Figure 8.65	FW2	CLODIAGH (TULLAMORE)_020 (IE_SH_25C0 60300)	Clodiagh [Tullamore]	25_585	Lower Shannon	Q3 (2017 and 2018) Q3-Q4 (2020) Q3 (2022)	Good	Watercress	2017: <i>Baetis</i> sp., Heptageniidae, <i>Gammarus</i> sp., cased and uncased caddis. 2018: Riffle beetle, Baetidae, cased and uncased caddis. 2020: Minnow, stone loach, great diving beetle, lamprey, <i>Leuctra</i> sp. <i>Gammarus</i> sp., and <i>Haliplus varius</i>. 2022: <i>Gammarus</i> sp., <i>Ecdyonurus</i> sp., blue-winged olive mayfly, <i>Haliplus</i> sp., riffle beetle, <i>Baetis</i> sp., Chironomid, cased caddis Phryganeidae, caddis larvae and stonefly. 2024: Not suitable for kick sampling, banks unsafe for entry.

Water Body Crossing ID	Figure Reference	Category	Watercourse Name	EPA Name	EPA Code	Catchment	Q-Value ¹	EPA Status	In-stream Vegetation ²	Benthic Invertebrates
WCX042	Figure 8.69	FW2	MEELAGHAN S_010 (IE_SH_25M5 20760)	Meelaghans	25_3091	Lower Shannon	Q3 (2016 and 2020)	Moderate	Watercress, watermint	2016: Large dark olive mayfly, Simuliidae, <i>Gammarus</i> sp., and Oligochaeta. 2018: Not suitable – too shallow and overgrown with in-stream vegetation. 2020: Non-biting midget, great diving beetle, iron blue mayfly, large dark olive mayfly, <i>Limnephilus</i> sp., <i>Haliphus varius</i> , margined ramshorn snail, <i>Gammarus</i> sp., bloodworm and Chironomid. 2024: Not suitable for kick sampling, channel too silty.
WCX044	Figure 8.71	FW2	TULLAMORE_010 (IE_SH_25T03 0030)	Tullamore	25_902	Lower Shannon	Q2 (2020) Q3 (2022) Q2-Q3 (2024)	Moderate	Duckweed, fool's watercress	2020: <i>Gammarus</i> sp. and Chironomid. 2022: <i>Gammarus</i> sp., caddis case (Limnephilidae), pond snail (Lymnaeidae). 2024: <i>Gammarus</i> sp., fresh water louse.
WCX045	Figure 8.71	FW2	TULLAMORE_010 (IE_SH_25T03 0030)	Tullamore	25_902	Lower Shannon	Q3-Q4 (2020) Q3 (2024)	Moderate	Fool's watercress, <i>Sparganium</i> sp., duckweed	2020: <i>Gammarus</i> sp., large dark olive mayfly, cased caddis, caseless caddis, Chironomid and river limpet (<i>Ancylus fluviatilis</i>). 2024: <i>Gammarus</i> sp., green olive mayfly, <i>Baetis</i> sp., watermite.
WCX048	Figure 8.77	FW2	DAINGEAN_030 (IE_SE_14D0 60400)	Daingean	14_1562	Barrow	Q2-Q3 (2017 & 2018) Q3 (2020) Q3 (2022)	Poor	<i>Sparganium</i> sp. fool's watercress and pondweed. (Filamentous algae)	2017: <i>Asellus</i> sp., <i>Gammarus</i> sp. <i>Leuctra</i> sp., <i>Baetis</i> sp., Diptera, Coleoptera, Oligochaeta and Hirudinea. 2018: <i>Gammarus</i> sp. and pond snail. 2020: <i>Gammarus</i> sp., leech, large dark olive mayfly, river limpet, Chironomid, fish leech (<i>Piscicola geometra</i>), roach (<i>Rutilus rutilus</i>), cased caddis, freshwater woodlouse and keeled ramshorn (<i>Planorbis carinatus</i>). 2022: Water hog louse, <i>Gammarus</i> sp., leech, Chironomid, Phryganeidae, caddis case, Limnephilidae, ramshorn snail, pond snail and blue-winged olive mayfly. 2024: Not suitable for kick sampling, water too deep.

Water Body Crossing ID	Figure Reference	Category	Watercourse Name	EPA Name	EPA Code	Catchment	Q-Value ¹	EPA Status	In-stream Vegetation ²	Benthic Invertebrates
WCX054	Figure 8.79	FW2	ESKER STREAM_020 (IE_SE_14E01 0200)	Leitrim 14	14_583	Barrow	Q2-Q3 (2017) Q3 (2020)	Moderate	Duckweed, fool's watercress	2017: <i>Glycera</i> sp. 2020: Mayfly, <i>Gammarus</i> sp., isopods. 2024: Great diving beetle.
WCX055	Figure 8.82	FW2	FIGILE_030 (IE_SE_14F01 0200)	Ballykilleen	14_1356	Barrow	Q2 (2017 - estimate) Q3 (2020)	Moderate	Watercress	2020: <i>Gammarus</i> sp., isopods, mayfly and worm. 2024: Not suitable for kick sampling, dry channel.
WCX056	Figure 8.82	FW2	FIGILE_030 (IE_SE_14F01 0200)	Figile	14_553	Barrow	Q3 (2017) Q3 (2024)	Moderate	Yellow water lily, <i>Phragmites</i> sp.	2017: Class C and D organisms in kick sample. 2024: <i>Gammarus</i> sp., great diving beetle.
WCX061	Figure 8.93	FW1	BLACKWATER (LONGWOOD)_010 (IE_EA_07B02 0060)	Mulgeeth	07_1747	Boyne	Q2 (2017 & 2018) Q3 (2020) Q3 (2022 & 2024)	Poor	Fool's watercress and duckweed	2017: Minnow, <i>Gammarus</i> sp. and <i>Asellus</i> sp. 2018: <i>Gammarus</i> sp., mayfly, Oligochaeta, Coleoptera larvae. 2020: <i>Gammarus</i> sp. and water beetle. 2022: <i>Gammarus</i> sp., water hog louse, great diving beetle, bivalve sp., beetle larvae, and Chironomid. 2024: <i>Gammarus</i> sp., water hog louse, cased caddis (Limnephilidae).
WCX064	Figure 8.96	FW2	BLACKWATER (LONGWOOD)_010 (IE_EA_07B02 0060)	Derrycrib	07_443	Boyne	Q2-Q3 (2024)	Poor	Watermint, duckweed, <i>Sparganium</i> sp., fool's watercress	2024: <i>Gammarus</i> sp., great diving beetle, fresh waterlouse.
WCX067	Figure 8.99	FW2	LYREEN_010 (IE_EA_09L02 0035)	Baltracy	09_1309	Liffey	Q2 (2020)	Poor	Bur-reed, flag iris, duckweed, watercress	2020: Isopods, worm, flatworm, <i>Gammarus</i> sp., snail.
WCX068	Figure 8.100	FW2	LYREEN_010 (IE_EA_09L02 0035)	Baltracy	09_1309	Liffey	Q3 (2017) Q2 (2020)	Poor	Watercress, <i>Phragmites</i> sp.	2017: <i>Asellus</i> sp., <i>Baetis</i> sp., <i>Tubifex</i> sp., Coleoptera and Hirudinea. 2020: Isopods, worm, flatworm, <i>Gammarus</i> sp., snail.

Water Body Crossing ID	Figure Reference	Category	Watercourse Name	EPA Name	EPA Code	Catchment	Q-Value ¹	EPA Status	In-stream Vegetation ²	Benthic Invertebrates
WCX071	Figure 8.103	FW2	LIFFEY_140 (IE_EA_09L01 1700)	Posseckstown 09	09_1644	Liffey	Q1-Q2; Q2 (2017; estimated) Q3 (2020)	Good	Fool's watercress	2020: <i>Gammarus</i> sp., mayfly and flatworm.
WCX074	Figure 8.104	FW2	REEVES_010 (IE_EA_09R1 40550)	Reeves	09_426	Liffey	Q2-Q3 (2016) Q1-Q2 (2018 – estimate)	Un-assigned	Watercress, reed canary grass, bur-reed	2016: <i>Gammarus</i> sp., freshwater woodlouse, stonefly, cased caddis, Simuliidae, riffle beetle. 2018: Visual estimate. 2019: Not assessed. 2020: Not assessed.

Note:

NA = non-applicable

— = no data/not recorded

¹ = Biological assessment procedure used by the EPA, which is based on a biological river quality (Q or biotic index) classification system (Toner *et al.* 2005)

² = Occasionally non-aquatic plant species were recorded in channels that were dry at the time of the survey but are still noted under 'in-stream vegetation'

8.3.3.3 Protected Aquatic Species – Atlantic Salmon

8.3.3.3.1 Atlantic Salmon – Desktop Review Results

375. The Atlantic salmon is listed under Annexes II and V of the Habitats Directive and Appendix III of the Bern Convention. It is an economically important species and salmon recreational and commercial fisheries occur throughout Ireland. Atlantic salmon are present in the main river channels and tributaries of the Lower River Shannon, Barrow, Boyne and the Liffey and Dublin Bay catchments. Atlantic salmon are an anadromous species, meaning they spawn in freshwater habitats and then migrate to the sea. Salmon habitats are usually fast flowing riffle and glide habitats with cobble or gravel substrates. Salmon angling areas are usually located on main river channels or small rivers in deep glides of 1.5m depth or more.
376. Crisp (2000) notes that salmon spawning site selection is governed by a complex of environmental factors including intra-gravel flow, gravel size, water depth as well as stream velocity and cover, which are all essential for successful spawning, egg survival and hatching. One of the most important factors for salmon egg survival is oxygen supply, which is dependent upon dissolved oxygen concentration and inter-gravel flow. High concentrations of suspended solids in the river are undesirable as they are likely to result in infilling of the gravel pores with fine material (Cowx and Fraser 2003).
377. Annual census data collected by ESB at Parteen Weir between 1960 and 2022, indicated that on average 1,405 Atlantic salmon pass through the fish pass each year. The minimum number of fish to pass through was 210 recorded in 2017 and the maximum number to pass was 5,663 recorded in 1968. During the drought year of 2018, 902 fish were recorded, which decreased to 883 in 2019. No data were recorded in 2020 and 2021 due to an issue with the fish counters. In 2022, 655 fish were recorded to pass. This year was also noted to be a dry summer with low Shannon inflows, and therefore low outflows.
378. In a report by IFI on the status of Irish salmon stocks in 2020, salmon stocks in the 'Upper Shannon (above Parteen)' achieved only 5% of its conservation limit (CL) and was assessed as being 'below' its CL 'above the impoundment' (Gargan *et al.* 2021). This information indicates, while numbers are low, Atlantic salmon still migrate upstream past the Ardnacrusha and Parteen weirs and past the RWI&PS site.
379. Atlantic salmon populations in Ireland have been assessed as being 'unfavourable – inadequate' by NPWS in the 2019 Article 17 Conservation Status Assessments (NPWS 2019c).

8.3.3.3.2 Atlantic Salmon – Field Survey Results

380. Atlantic salmon were incidentally recorded on five occasions during dip net surveys: once within the Blackwater (Clare) River, County Clare; once in the Ardgregane River (WCX013) and Kilmastulla River (WCX077), County Tipperary; once in the Camcor River (WCX032), County Offaly; and once in the Liffey River (WCX073), County Kildare, during dip netting surveys (Appendix A8.14: Watercourse Crossing Data). The majority of watercourses crossed by the Proposed Project are unsuitable/suboptimal with regard to salmonid spawning considering the lack of gravel substrates, poor aeration due to sluggish flows and degree of siltation. It is also noted that several of the watercourses in the study area drain agricultural lands and bog habitats and have artificially high levels of suspended solids during flood events and/or peaty deposits on the riverbeds. These conditions do not support the habitat requirements of salmon spawning.

381. In Parteen Basin, one individual salmon (measured at 75cm) was recorded in the pelagic zone during the fish stock assessment in 2016 (Appendix A8.15: National Research Programme Lakes 2016: Parteen Basin (Lower Lough Derg), Inland Fisheries Ireland Report). No suitable spawning habitat for salmon was found during the aquatic ecological survey at the RWI&PS site (Appendix A8.17: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2017), Appendix A8.18: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2019), and Appendix A8.23: Aquatic Invasive Species and Macrophyte Survey at Lough Derg and Parteen Basin). The nearest suitable spawning habitat to Parteen Basin for salmon is approximately 5km upstream of Killaloe in the Annacarriga River.

8.3.3.4 Protected Aquatic Species – Freshwater Pearl Mussel

8.3.3.4.1 Freshwater Pearl Mussel – Desktop Review Results

382. The freshwater pearl mussel is a large bivalve species found in oligotrophic, soft to neutral waters of rivers and, occasionally, in lakes. In Ireland, the species is concentrated along the western seaboard but also occurs in the south and east where geology allows.
383. The biology and ecology of the species are particularly notable in that individuals can grow to very large sizes relative to other freshwater molluscs, building up thick calcareous valves, in rivers with relatively soft water and low levels of calcium. Their shell building is consequently very slow, and individuals in natural conditions live to over a hundred years of age.
384. In Ireland, a total of 27 populations have been designated within 21 SAC areas for *Margaritifera*. NPWS (2019c) note that the freshwater pearl mussel is found in 150 rivers in 100 catchments/sub-catchments across 16 counties (Carlow, Cavan, Clare, Cork, Donegal, Galway, Kerry, Kilkenny, Laois, Limerick, Mayo, Sligo, Tipperary, Waterford, Wexford and Wicklow). Freshwater pearl mussel populations in Ireland have been recently assessed as being 'unfavourable – bad' by NPWS in the 2019 Article 17 Conservation Status Assessments (NPWS 2019c).
385. A desktop review indicated the freshwater pearl mussel does not occur in the study area of the Proposed Project or in directly downstream areas. Freshwater pearl mussel is a qualifying interest species of the River Barrow and River Nore SAC and the Lower River Shannon SAC. Freshwater pearl mussel occurs abundantly in parts of the Cloon River, County Clare, which is part of the Lower River Shannon SAC, downstream of the Proposed Project. There is no hydrological connection between this freshwater pearl mussel population and the Proposed Project, therefore there is no potential for impacts to occur. The known locations of freshwater pearl mussel on the River Barrow include Aughnavad, Ballymurphy, and Mountain (Aughnabrisky), all of which are tributaries of the River Barrow and flow west from the Blackstairs Mountains to join the River Barrow main channel. Therefore, they will not receive any surface water flow from the main channel and there is no pathway or potential for impacts on these rivers as a result of the Proposed Project.
386. The River Barrow originates in the Slieve Bloom Mountains. It initially flows northeast where it reaches the closest proximity to the Proposed Project (2.5km) before flowing south. There are several tributaries which join the River Barrow, however none of these (with the exception of the Figile River, County Offaly which is a fourth-order river) intersect the Proposed Project. The Figile River intersects the Proposed Project at several locations within Figile_010 (IE_SE_14F010061), Figile_020 (IE_SE_14F010100), Figile_030 (IE_SE_14F010200) and Figile_040 (IE_SE_14F010300). At Figile_040 the river flows south, with Figile_080 (IE_SE_14F010600) joining the main channel of the River Barrow at Barrow_090 (IE_SE_14B011000). It is at this point, more than 20km downstream of the Proposed Project, that the Figile enters the River Barrow and River Nore SAC. The main channel continues to Barrow_240 (IE_SE_14B013600) prior to discharge at the Upper Barrow Estuary (IE_SE_100_0300). Therefore, the potential for impacts via hydrological pathways is only considered via the Figile and the main channel of

the River Barrow. As previously mentioned in Section 8.2.5.2.3, 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 and therefore, hydrological pathways would not reach tributaries where populations of freshwater pearl mussel occur.

387. There are 135 proposed crossings within a 'catchment with previous records of *Margaritifera*, but current status unknown' in accordance with the NPWS *Margaritifera* Sensitive Area mapping (NPWS 2018a). The majority of these crossings (119) are small, first-order drains, which would be crossed using open trench techniques. The larger water bodies include the Figile River and the Grand Canal. It is proposed to cross both of these watercourses using trenchless excavation. The potential impacts associated with these crossings on protected aquatic species are assessed in Section 8.5.3.3.

8.3.3.4.2 Freshwater Pearl Mussel – Field Survey Results

388. No dedicated field surveys were undertaken for this species and no freshwater pearl mussel were recorded during any of the surveys undertaken between 2016 and 2025.

8.3.3.5 Protected Aquatic Species – White-clawed Crayfish

8.3.3.5.1 White-clawed Crayfish – Desktop Review Results

389. The white-clawed crayfish is protected under both European and Irish legislation. It is protected by the Wildlife Acts and has been classified as endangered in the International Union for Conservation of Nature (IUCN) Red List. It is also listed under Appendix III of the Bern Convention and Annexes II and V of the Habitats Directive.
390. The white-clawed crayfish is Ireland's only native crayfish species. Ireland is understood to hold some of the best European stocks of this species, under least threat from external factors. Irish stocks are therefore of substantial conservation importance (Reynolds 1998). White-clawed crayfish are widespread in areas which are underlain by Carboniferous limestone, or its derivative – glacial drift (Reynolds 1998). Demers *et al.* (2005) reported that white-clawed crayfish are still widespread in the rivers of the Irish midlands, where the geology is predominantly limestone. However, these authors also report that the distribution of white-clawed crayfish in rivers has been restricted since the mid-1980s. This was attributed in part to an outbreak of the crayfish plague.
391. According to Reynolds (1998), the main threats to the white-clawed crayfish in Ireland are stream drainage, pollution and the introduction of predators, competitors or diseases. Ongoing drainage maintenance on arterially drained rivers in Ireland has also been identified as having a significant adverse effect on this species (O'Connor & McDonnell 2008).
392. In Britain, the North American signal crayfish (*Pacifastacus leniusculus*) was introduced for aquaculture and subsequently escaped into the wild, where it has had a devastating effect on white-clawed crayfish populations. While this species has not been recorded in Ireland, there is a real threat that this INNS could reach this country.
393. The crayfish plague, which is believed to have been transmitted by introduced crayfish species or through contaminated equipment, 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 (Department of Arts, Heritage and Gaeltacht 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 AI, 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 Catchments Unit 2021).

394. Establishment of the crayfish plague could result in 100% mortality of the species. Throughout its European range, this species has been decimated by the impact of crayfish plague which spread to Europe with the introduction of the plague carrier North American species of crayfish. The implications of this disease occurrence are extremely concerning. If crayfish plague continues to spread and become established there is a high probability that the native white-clawed crayfish would be eliminated from much of Ireland (NBDC 2019). The full effects of the latest plague outbreak on the Irish crayfish population are as yet unknown; however, prior to the outbreak of the plague, the white-clawed crayfish was generally considered to be widespread in lowland rivers such as the River Barrow and River Boyne and their tributaries.
395. The Proposed Project traverses seventeen 10km grid squares within the current distribution of white-clawed crayfish (Table 8.41). A review of the NBDC records revealed 226 records of crayfish within the 10km grid squares encompassing the Proposed Project. The majority of these recordings were in larger third-order watercourses. There were no records of crayfish within Parteen Basin or Lough Derg in the NBDC database; however, crayfish have been recorded upstream in tributaries to Lough Derg, over 40km from the RWI&PS site.
396. Additionally, an updated rare and threatened protected species data request was made to NPWS in 2025, which provided records of white-clawed crayfish within the following 10km grid squares; R56, R66, R87, R88, R98, R99, S08, S09, N00, N10, N21, N31, N41, N42, N52, N62, N72, N73, N83, N92, N93 and O03.
397. The overall Article 17 assessment for white-clawed crayfish is unfavourable-Inadequate (NPWS 2019c).

8.3.3.5.2 *White-clawed Crayfish – Field Survey Results*

398. White-clawed crayfish were not recorded in Parteen Basin within the proposed RWI&PS site during the aquatic ecological surveys in August 2017, August 2019 or August 2021. Crayfish were however recorded during aquatic surveys between 2016 and 2024 at the sampling locations of six of the proposed watercourse crossings: Ardgregane Stream (WCX013), Rock (Birr) Stream (WCX027), Silver River (WCX036), Clodiagh River (WCX039), River Liffey (WCX073) and Reeves Stream (WCX074) (Appendix A8.14: Watercourse Crossing Data). This species is expected to occur in most watercourses crossed by the Proposed Project, where suitable habitat and water chemistry occurs.

8.3.3.6 *Protected Aquatic Species – Lamprey Species*

8.3.3.6.1 *Lamprey Species – Desktop Review Results*

399. Parteen Basin and Lough Derg have been designated as a SAC and are of conservation interest for their fish species, including all three species of lamprey which have all been observed spawning in the Lower River Shannon and its tributaries.

8.3.3.6.1.1 Brook Lamprey (*Lampetra planeri*)

400. Brook lamprey is listed in Annex II of the Habitats Directive and in Appendix III of the Bern Convention.
401. Brook lamprey are the most common and widespread of the three lamprey species native to Ireland (Kurtz & Costello 1999). It is also the smallest of the three and is the only one that is non-parasitic and spends all its life in freshwater undertaking only localised migrations (Maitland & Campbell 1992). The preferred spawning habitat for brook lamprey comprises small streams with areas of riffle or swift glide (often at the tail end of pools) in water up to 40cm in depth, where well-aerated gravels are present. Lamprey excavate shallow depressions (known as redds) into which they lay their eggs. Brook lamprey live for up to five years burrowed into silt deposits in rivers. They metamorphose into adults and spawn in the early spring in fast-flowing streams with gravel substrates. The spawning season of brook lamprey starts when the water temperatures reach 10-11°C (Maitland 2003). This usually occurs in March/April.
402. The sampling programme for brook lamprey indicated that it has a widespread distribution with sufficiency of area and quality habitat (NPWS 2019c). The species was recorded in all size of channels, from first-order streams to large sixth-order rivers (NPWS 2019c). Of the 26 national 10km grid squares that the Proposed Project intersects, all are noted as being within the 'current range' and 17 are within the 'current distribution' for brook lamprey (Table 8.41). There are 503 proposed watercourse crossings within these 17 grid squares. These include tributaries of the Kilmastulla River, Blackwater Longwood River and its tributaries, Lyreen River and its tributaries, the River Liffey and its tributaries, and the Grand Canal. The proposed Raw Water Abstraction is located within grid R67 which is part of the current range for brook lamprey; however, given brook lamprey are associated with small streams, they are not likely to occur in Parteen Basin. Their distribution is currently not documented or mapped within the Lower River Shannon SAC.
403. Although still common in Ireland, brook lamprey are under significant threat from drainage and navigation maintenance works and also from water quality deterioration. Brook lamprey are also doing less well across the rest of the EU. In this regard Irish populations of brook lamprey are of international importance. Currently in Ireland there is no close season for in-stream works during lamprey spawning season so they are vulnerable due to the lack of this type of protection. Fisheries programmes in Ireland are targeted almost exclusively on recreational fisheries. There has not been to date or to any significant extent, a fishery (entity engaged in raising or harvesting fish) for lamprey in Ireland.
404. Brook lamprey populations in Ireland have been assessed as 'favourable' by NPWS in the 2013 Article 17 Conservation Status Assessments (NPWS 2019c).

8.3.3.6.1.2 River Lamprey (*Lampetra fluviatilis*)

405. River lamprey is listed in Annex II and IV of the Habitats Directive and also in Appendix III of the Bern Convention.
406. The river lamprey is larger in size than the brook lamprey and exhibits an anadromous life cycle. River lamprey are poor swimmers and climbers and as a result are often confined to the lower reaches of catchments. As mentioned, the river and brook lamprey are indistinguishable as larvae, living as filter feeders in sediment.
407. The approach to lamprey status assessment in Ireland has focused on juvenile lamprey or ammocoetes. This is because it is feasible to carry out cost-effective catchment-wide surveys on ammocoetes over an extended annual time window. Such opportunities do not present themselves for the adult spawning phase of brook or of river lamprey. Consequently, the vast majority of available data relate to '*Lampetra* sp.' and cannot be assigned to one species or the other (NPWS 2019c).

408. For the above reasons, when reporting on the conservation status of species listed on the annexes of the Habitats Directive, NPWS presented a joint assessment that covers both brook and river lamprey. Thus, the current distribution range for river lamprey is the same as brook lamprey (as discussed above). The proposed Raw Water Abstraction is located within grid R67 which is part of the current range for river lamprey. A desktop study review found that river lamprey spawning has been recorded in the vicinity of Plassey, County Limerick in the Old River Shannon and is likely to occur at suitable habitat upstream as far as Parteen Weir and on the River Mulkear. There are no data to suggest that this species occurs upstream of the Ardnacrusha or Parteen Weirs.
409. River lamprey populations in Ireland have been recently assessed as being 'favourable' by NPWS in the 2019 Article 17 Conservation Status Assessments (NPWS 2019c). However, this has been based on the fact that they have been grouped together with brook lamprey populations due to identification difficulties.

8.3.3.6.1.3 Sea Lamprey (*Petromyzon marinus*)

410. Similar to brook and river lamprey, sea lamprey are also listed in Annex II of the Habitats Directive and Appendix III of the Bern Convention.
411. The sea lamprey is the largest of the Irish lamprey species and, as with the river lamprey, has an anadromous life cycle. Although more capable than river lamprey, sea lamprey are poor swimmers and climbers and are generally confined to the lower reaches of catchments, if present. Adult sea lamprey excavate redds or spawning nests in gravelled areas, generally in the open channel areas of large rivers.
412. The current range and distribution for sea lamprey overlaps with the Proposed Project at Parteen Basin only (Table 8.41). Sea lamprey were not recorded and are not expected to occur in any of the watercourses crossed by the Proposed Project.
413. The NPWS (2019c) notes that in several sea lamprey rivers (e.g. the Mulkear, the Feale, the Fergus, the Barrow), severe barriers to passage occur at the upstream end of the tidal freshwater and that this does not represent a favourable situation. Parteen Basin and Lough Derg have been designated as a SAC and are of conservation interest for their fish species including sea lamprey which have been observed spawning in the Lower River Shannon and its tributaries. Sea lamprey spawn in fast flowing water, so spawning is likely to take place in watercourses entering Lough Derg and Parteen Basin. Currently within the Lower River Shannon SAC, sea lamprey spawning appears to be confined to the Old River Shannon downstream of Parteen Weir. Lough Derg also contains a landlocked population of sea lamprey. However, as mentioned, no lamprey species were recorded during aquatic surveys at the proposed RWI&PS site or during the fish stock assessment of Parteen Basin and Lough Derg (Appendix A8.17: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2017), Appendix A8.18: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2019), Appendix A8.15: National Research Programme Lakes 2016: Parteen Basin (Lower Lough Derg), Inland Fisheries Ireland Report and Appendix A8.16: National Research Programme Lakes 2016: Lough Derg, Inland Fisheries Ireland Report, respectively).
414. Sea lamprey populations in Ireland have been recently assessed as being 'unfavourable – bad' by NPWS in the 2019 Article 17 Conservation Status Assessments (NPWS 2019c).

8.3.3.6.2 Lamprey Species – Field Survey Results

415. In Parteen Basin, at the proposed RWI&PS site, a series of 15cm cores were taken 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 (Appendix A8.17: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2017), Appendix A8.18: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2019), and Appendix A8.23: Aquatic Invasive Species and Macrophyte Survey at Lough Derg and Parteen Basin). 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 (Appendix A8.15: National Research Programme Lakes 2016: Parteen Basin (Lower Lough Derg), Inland Fisheries Ireland Report and Appendix A8.16: National Research Programme Lakes 2016: Lough Derg, Inland Fisheries Ireland Report).

8.3.3.6.2.1 Brook Lamprey (*Lampetra planeri*)

416. Brook lamprey were recorded on three occasions during aquatic field surveys between 2016 and 2024: in a tributary of the Kilmastulla River (WCX004), in the Ardregane Stream (WCX013), and in Clareen Stream (WCX029) (Appendix A8.14: Watercourse Crossing Data). Lamprey ammocoetes were also recorded in the Knockadromin Stream (WCX002), the Patrickswell 25 Stream (WCX010), the Ballyfinboy Stream (WCX021), the Rock (Birr) Stream (WCX027), the Clareen Stream (WCX029), the Breaghmore (WCX031), the Camcor River (WCX032), the Silver River (WCX036), the Clodiagh River (WCX039), the Kilmastulla (WCX077), in two drainage ditches directly west of the RWI&PS (WBX001 and WBX002), and in a third drainage ditch in County Tipperary (WBX034) during aquatic field surveys. It is not possible to identify *Lampetra sp.* ammocoetes to species level in the field and the current distribution range for both species is the same; therefore it is not possible to distinguish if these juvenile lamprey were brook or river lamprey, however both species are afforded the same level of protection.

8.3.3.6.2.2 River Lamprey (*Lampetra fluviatilis*)

417. No river lamprey species were recorded during the aquatic field surveys between 2016 and 2024, with the exception of the possibility of the lamprey ammocoetes as noted above (Appendix A8.14: Watercourse Crossing Data).

8.3.3.6.2.3 Sea Lamprey (*Petromyzon marinus*)

418. No sea lamprey species were recorded during the aquatic field surveys between 2016 and 2024.

8.3.3.7 Protected Aquatic Species – Summary

419. The Proposed Project intersects 26 national 10km grid squares. Table 8.41 shows the current distribution of protected aquatic fauna in the 10km grid squares relevant to the Proposed Project based on the 2019 Article 17 Assessments (NPWS 2019a; 2019b; 2019c).

Table 8.41: Distribution of Protected Aquatic Species in the 10km Grid Squares Relevant to the Proposed Project

Counties	County Tipperary	County Offaly	County Kildare	County Dublin
10km grid square(s)	R56, R66, R67, R76, R77, R87, R88, R98, R99	N00, N10, N11, N21, N31, N41, N42, N52, N62, S08, S09	N72, N73, N83, N92, N93	O03
Atlantic salmon	R56, R66, R67, R76	N31, N41, N42, N52, N62, S08	N72, N73, N83, N92, N93	O03
Freshwater pearl mussel	Not recorded	Not recorded	Not recorded	Not recorded
White-clawed crayfish	R56, R76, R77, R88, R87, R98 (current range only) R66, R87, R99	S08, S09 (current range only) N00, N10, N11, N21, N31, N41, N42, N52, N62	N73 (current range only), N72, N83, N92, N93	O03
Brook lamprey	R56, R67, R88, R98, R99 (current range only), R66, R76, R77, R87	N10, N21, N42 and S08 (current range only), N00, N11, N31, N41, N52, N62, S09	N72, N73, N83, N92, N93	O03
River lamprey	R66 (current range only), R56	Not recorded	Not recorded	Not recorded
Sea lamprey	R66, R67, R76, R77, R88	Not recorded	Not recorded	Not recorded

Note: Source of information: Based on Article 17 Assessments (NPWS 2019a; 2019b; and 2019c) and sensitive species grid mapping provided by NPWS.

420. The Proposed Project crosses a total of 639 watercourses. Following the aquatic surveys, a number of these crossings were evaluated as having suitable salmonid, lamprey and crayfish habitat as well as suitable spawning habitats for salmon and lamprey. A summary of which watercourse crossings these species and habitats were recorded in, is provided in Table 8.42.

Table 8.42: Summary of Salmon, Lamprey and White-clawed Crayfish Habitats and Potential Habitat Within the Proposed Project

Water Body Crossing ID	Chainage	Figure Reference	Fossitt Category	Spawning Habitat (For Salmonids and Lamprey Species)	Protected Species			Crossing Methodology
					Salmonid ¹	Lamprey	Crayfish	
PSNWBX005	Off Pipeline	Figure 8.7	FW3	—	Potential	Potential	Potential	38 kV Overhead Line
PSNWBX007	Off Pipeline	Figure 8.10	FW2	—	No potential	No potential	Potential	38 kV Overhead Line
PSNWBX010	Off Pipeline	Figure 8.10	FW4	Good	Potential	Potential	Potential	38 kV Overhead Line
PSNWCX001	Off Pipeline	Figure 8.4	FW2	Good	Potential	Potential	Potential	38 kV Overhead Line
PSNWCX002	Off Pipeline	Figure 8.4	FW2	Moderate	High potential - salmonids recorded	High potential	—	38 kV Overhead Line
PSNWCX003	Off Pipeline	Figure 8.5	FW1	Limited	Trout potential	Potential	No	38 kV Overhead Line
PSNWCX004	Off Pipeline	Figure 8.7	FW2	—	Potential	No potential	Potential	38 kV Overhead Line
WBP309	TWC–700	Figure 8.67	FW1	Low to Moderate potential — trout potential	No potential	No potential	No potential	Open trench
WBX001	RW– 300	Figure 8.11	FW4	Good — Lamprey potential	No potential	River/brook lamprey Lamprey potential	No potential	Open trench
WBX002	RW– 400	Figure 8.11	FW4	Good — Lamprey potential	No potential	River/brook lamprey Lamprey potential	No potential	Open trench
WBX008	TW–3500	Figure 8.14	FW1	Low to Moderate potential — trout potential	Low to moderate potential	Low to moderate potential	Low to moderate potential	Trenchless
WBX010	TW–4000	Figure 8.14	FW4	Low to Moderate potential — trout potential	Low to moderate potential	No potential	No potential	Open trench
WBP011	TWA – 15300	Figure 8.40	FW4	No potential — No suitable habitat	Potential recorded	None recorded. No potential.	None recorded. No potential.	Open trench
WBX012	TW–4900	Figure 8.15	FW1	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 potential	No potential	No potential	Open trench
WBX017	TW–19200	Figure 8.23	FW4	No potential — No suitable habitat	No potential	Limited potential	No potential	Open trench
WBX023	TWA–7800	Figure 8.36	FW4	No potential — No suitable habitat due to heavy vegetation	No potential	Limited potential	No potential	Open trench
WBX025	TWA–12100	Figure 8.38	FW4	None	Moderate potential	Moderate potential	No potential	Open trench
WBX026	TWA – 13200	Figure 8.39	FW4	No potential — No suitable habitat	None recorded. No potential.	None recorded. Low - moderate potential.	None recorded. No potential.	Open trench
WBX027	TWA–14800	Figure 8.40	FW1	Low to Moderate potential — Some suitable gravels present	2018: Brown trout recorded	Low potential	Low potential	Open trench
WBX030	TWA – 21100	Figure 8.43	FW2	Possible spawning habitat	None recorded. Potential.	None recorded. Potential.	None recorded. Potential.	Open trench
WBX033	TWA–21300	Figure 8.43	FW2	No potential	No potential	Low potential	No potential	Open trench
WBX034	TWA–27200	Figure 8.46	FW4	Good — potential d/s with suitable gravels and silt	2017: Brown trout present	Limited potential 2020: Positive scoop test for lamprey: 7 juvenile river/brook in three scoops	No potential	Open trench
WBX038	TWB–4600	Figure 8.54	FW1	—	Low potential	Low potential	Low potential	Open trench
WBX039	TWB–4800	Figure 8.54	FW4	Low potential — lack of gravel/cover and appropriate flow	Low potential	Low potential	Low potential	Open trench
WBX057	TWC–6900	Figure 8.70	FW4	Low potential	Low potential	Low potential	Low potential	Open trench
WBX058	TWC–10000	Figure 8.72	FW4	Low potential	Low potential	Low potential	Low potential	Open trench
WBX060	TWC–10300	Figure 8.72	FW4	Low potential	No potential	No potential	No potential	Open trench
WBX061	TWC–10400	Figure 8.72	FW4	Low potential	No potential	No potential	No potential	Open trench
WBX062	TWC–11100	Figure 8.72	FW4	Low potential	Low potential	Low potential	Low potential	Open trench
WBX078	TWD–15100	Figure 8.89	FW3	No potential — no suitable gravels and low flow. Substrate heavily vegetated and silty. No suitable habitat for juvenile lamprey	Salmonid potential	No potential	No potential — likely too acidic	Trenchless
WBX088	TWE–14200	Figure 8.106	FW3	No potential — no spawning gravels, organic substrate and lots of instream vegetation. No riffle habitats. Not suitable for juvenile lamprey	No potential	Low potential	Low potential — instream vegetation with low flow. No overhanging vegetation	Trenchless
WBX092	TWB–13600	Figure 8.59	FW4	No potential — No suitable habitat	Low potential	Low potential	Low potential	Open trench
WBX093	TWB–14800	Figure 8.59	FW4	No potential — No suitable habitat	No potential	Low potential	No potential	Open trench

Water Body Crossing ID	Chainage	Figure Reference	Fossitt Category	Spawning Habitat (For Salmonids and Lamprey Species)	Protected Species			Crossing Methodology
					Salmonid ¹	Lamprey	Crayfish	
WBX094	TWB–19100	Figure 8.62	FW4	Low potential	Low potential	Low potential	Low potential	Open trench
WBX097	TWC–11000	Figure 8.72	FW4	Low potential	Low potential	Low potential	Low potential	Open trench
WBX107	TWB–4700	Figure 8.54	FW1	—	Low potential	Low potential	Low potential	Open trench
WBX109	Off Pipeline	Figure 8.89	FW3	No potential — No suitable habitat	Low potential	No potential	No potential	Road
WBX112	Off Pipeline	Figure 8.50	FW2	None recorded. No potential.	None recorded. Potential.	None recorded. No potential.	None recorded. No potential.	Open cut
WCX001	Off Pipeline	Figure 8.12	FW2	Yes high. Good spawning and nursery habitat	Yes high. Good spawning and nursery habitat	Potential for crayfish and lamprey	Potential for crayfish and lamprey	Trenchless
WCX002	Off Pipeline	Figure 8.12	FW1	Potential for spawning and nursery habitat	Potential for salmonids: potential but steeply sloping weir with apron at confluence of river d/s	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 vegetation or suitable bank for burrows	Clear span bridge
WCX003	TW–700	Figure 8.12	FW1	Good	Trout potential	Lamprey potential	Crayfish potential	Open trench
WCX004	TW–1000	Figure 8.13	FW1	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 brown trout observed	2016: Brook lamprey u/s of crossing 2019: Undercut banks with silty banks and pools suitable for lampreys 2020: None recorded	Crayfish potential	Clear span bridge
WCX005	TW–7500	Figure 8.16	FW1	Moderate	2017: Trout recorded	2019: Undercut bank with nice glide suitable for lamprey 2020: Suitable for brook lamprey d/s	Crayfish potential. 2020: d/s not suitable for crayfish	Open trench
WCX006	TW–8500	Figure 8.17	FW1	Low to Moderate — heavy siltation	Salmonid potential	Lamprey potential — Undercut banks, silt banks suitable for lampreys	None recorded. Crayfish potential	Open trench
WCX008	TW–10200	Figure 8.18	FW1	Low potential	Low potential	Moderate potential	No Potential	Open trench
WCX009	TW–10500	Figure 8.18	FW1	No potential — No suitable habitat	No potential	Low potential	No potential	Open trench
WCX010	TW–11200	Figure 8.18	FW4	No potential — No suitable habitat	No potential	Scoop test positive for lamprey ammocoetes	No potential	Open trench
WCX012	TW–15000	Figure 8.20	FW2	Low potential	Potential Brown trout sighting	No potential	No potential	Open trench
WCX013	TW–16500	Figure 8.21	FW2	Moderate — good habitat for lamprey with lots of cover from vegetation, good flow and depth, silty banks for eggs	2017: Brown trout recorded Good potential — Salmonids recorded	2017: Brook lamprey recorded. Potential — Lamprey ammocoetes recorded (6–8cm)	2017: Crayfish recorded Potential	Open trench
WCX016	TW–19500	Figure 8.23	FW2	Good	2016: Brown trout recorded Potential	Potential	Potential	Trenchless
WCX021	TW–35000	Figure 8.31	FW2	Good	2018: Potential brown trout observed Potential	Lamprey ammocoetes recorded in 2024 Potential	Crayfish potential	Open trench
WCX023	TWA–5600	Figure 8.35	FW2	Low potential	Potential	Potential	No potential	Open trench
WCX024	TWA–8000	Figure 8.36	FW2	2019: Good — spawning gravels with moderate flow and good depth 2020: None	No potential	No potential	No potential	Open trench
WCX025	TWA–9400	Figure 8.37	FW1	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	Open trench
WCX026	TWA– 13000	Figure 8.39	FW2	Moderate	Trout and coarse fish potential	Potential	Potential	Trenchless
WCX027	TWA–17500	Figure 8.41	FW1	Moderate — suitable for lamprey and salmonids	Potential	Potential Lamprey recorded in 2024	Potential Crayfish recorded in 2024	Open trench
WCX028	TWA–23800	Figure 8.42	FW2	Low to Moderate potential — Some suitable gravels present	2016: Trout present No potential	No potential	No potential	Open trench

Water Body Crossing ID	Chainage	Figure Reference	Fossitt Category	Spawning Habitat (For Salmonids and Lamprey Species)	Protected Species			Crossing Methodology
					Salmonid ¹	Lamprey	Crayfish	
WCX029	TWA–24800	Figure 8.42	FW1	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	Open trench
WCX031	TWA–26000	Figure 8.45	FW2	Good — High quality, mixed sediments and undercut banks with high quality gravels and mix of riffle and pool throughout survey area. Good spawning potential for lamprey	Trout jumping under trees, very good salmonid spawning and nursery habitat	No lamprey in scoop test, good spawning habitat for lamprey	Crayfish potential	Trenchless
WCX032	TWA–27600	Figure 8.46	FW2	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 u/s Potential	Crayfish potential	Trenchless
WCX033	TWB–1400	Figure 8.47	FW2	Low potential	Salmonid potential	Lamprey potential	No potential	Open trench
WCX034	TWB–6600	Figure 8.56	FW4	Low potential — No flow, heavily silted substrate	Low potential	Low potential	Low potential	Open trench
WCX035	TWB–7800	Figure 8.56	FW4	Low potential	Low potential	Low potential	Low potential	Open trench
WCX036	TWB–12600	Figure 8.59	FW2	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 (d/s): Juvenile river/brook lamprey recorded in scoop test	2017: Crayfish recorded 2020: Crayfish recorded d/s	Trenchless
WCX039	TWB–24900	Figure 8.65	FW2	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	Trenchless
WCX040	TWC–1000	Figure 8.67	FW4	Low to Moderate potential — trout potential	No potential	No potential	No potential	Open trench
WCX041	TWC–3300	Figure 8.68	FW1	Low potential	No potential	No potential	No potential	Open trench
WCX042	TWC–5000	Figure 8.69	FW2	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 u/s of wayleave but no juvenile lamprey	Kick net sweep d/s of wayleave and within wayleave — none recorded. Good potential — well oxygenated, calcareous, and vegetated watercourse	Open trench
WCX043	TWC–5600	Figure 8.69	FW2	No potential — No suitable habitat	No potential	None recorded Low potential	No potential	Open trench
WCX044	TWC–8900	Figure 8.71	FW2	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	Open trench
WCX045	TWC–9700	Figure 8.71	FW2	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	Open trench
WCX048	TWC–18900	Figure 8.77	FW2	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	Open trench
WCX049	TWC–20300	Figure 8.77	FW2	Low potential	No potential	Low potential	Low potential	Open trench
WCX054	TWC–22800	Figure 8.79	FW2	Low potential	No potential	Potential	No potential	Open trench
WCX056	TWD–4200	Figure 8.82	FW2	Moderate — river in flood, couldn't see the substrate, but nearby peatland habitat so spawning gravels unlikely. Suitable spawning and holding for salmonids at u/s bridge	2017: Potential trout recorded (fishing evident) Potential	Lamprey potential	Low potential — likely too acidic	Trenchless
WCX057	TWD–6400	Figure 8.83	FW2	No potential — no suitable habitat. Could not view substrate due to high water levels. Surrounding peat habitat makes spawning gravels unlikely	Potential	Potential	Potential	Trenchless
WCX058	TWD–8900	Figure 8.86	FW2	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	Open trench
WCX059	TWD–14400	Figure 8.89	FW2	No potential — No suitable habitat	Salmonid potential	Potential	Potential	Open trench

Water Body Crossing ID	Chainage	Figure Reference	Fossitt Category	Spawning Habitat (For Salmonids and Lamprey Species)	Protected Species			Crossing Methodology
					Salmonid ¹	Lamprey	Crayfish	
WCX060	TWD–18100	Figure 8.90	FW2	Limited spawning or nursery habitat for salmonids and lamprey	Low potential	No potential	No potential	Open trench
WCX061	TWD–24300	Figure 8.93	FW2	No potential — water quality very poor, no flow, stagnant, anoxic odour and oil slick. Fuel drum in water u/s of wayleave. No gravels. Peat and silt substrate. Bog u/s	Salmonid potential	Potential	Potential	Open trench
WCX062	TWD–26400	Figure 8.94	FW2	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	Open trench
WCX064	TWD–28500	Figure 8.96	FW2	No potential — No suitable habitat. No flow, and peaty substrate. Not suitable for crayfish	No potential	Limited potential	No potential	Open trench
WCX065	TWD–29100	Figure 8.96	FW2	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	Low potential — no spawning potential but suitable salmonids habitat — pool and riffles, undercut banks, instream vegetation	Low potential — silt beds	No potential	Open trench
WCX066	TWD–32700	Figure 8.98	FW2	No potential — No suitable habitat	Potential	Potential	No potential	Open trench
WCX067	TWE–700	Figure 8.99	FW2	No potential — low flow, silt substrate, no suitable gravels or riffle	No potential	No potential	Potential	Open trench
WCX068	TWE–1800	Figure 8.100	FW2	Good — suitable spawning gravels approx. 200m u/s of wayleave. Riffle flow. Undercut banks. Overhanging vegetation. No suitable silt beds for juvenile lamprey	Good potential	Moderate potential — suitable spawning gravels approx. 200m u/s of wayleave. No suitable silt beds for juvenile lamprey. None recorded during kick net sweep and hand search along length of otter transect	No potential — lack of in-stream vegetation	Open trench
WCX069	TWE–2400	Figure 8.100	FW1	Moderate — some spawning gravels and riffle within wayleave. Undercut banks and overhanging vegetation. Silt beds with potential for juvenile lamprey	Moderate potential	Moderate potential — Silt beds with potential for juvenile lamprey	Low potential — Undercut banks and overhanging vegetation but no instream vegetation	Open trench
WCX070	TWE–3600	Figure 8.101	FW2	Low potential	Low potential	Low potential	Low potential	Open trench
WCX071	TWE–9000	Figure 8.103	FW2	No potential — some gravels approx. 150m d/s of wayleave. Mainly silt substrate and heavily vegetated. Low flow	No potential	No potential	Low potential — silt substrate, heavily vegetated and low flow	Open trench
WCX072	TWE–9100	Figure 8.103	FW2	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	Open trench
WCX073	TWE–9800	Figure 8.104	FW2	Good — River in flood so unable to assess substrate. Likely to be high potential for spawning gravels. Also likely to be suitable silt beds during low flow conditions for juvenile lamprey	2017: Salmon, trout recorded Potential	Lamprey potential	2017: Crayfish recorded Potential	Trenchless
WCX074	TWE–11400	Figure 8.105	FW2	No potential — high siltation and no flow. Sediment also not suitable	No potential	No potential	2016: Crayfish caught	Open trench
WCX077	Off Pipeline	Figure 8.11	FW2	Spawning and nursery habitat present	Potential — Salmon and brown trout recorded in 2024	Potential	Potential	Trenchless
WCX078	Off Pipeline	Figure 8.52	FW1	—	Potential	Potential	Potential	Road
WCX079	Off Pipeline	Figure 8.85	FW2	None	Potential	Potential	No Potential	Power to line valve (OHL)
WCX082	Off Pipeline–	Figure 8.79	FW2	—	Potential	No potential	No potential	Power to line valve (OHL)
WCX083	Off Pipeline	Figure 8.88	FW2	—	Potential	No potential	No potential	Power to line valve (OHL)
WCX085	Off Pipeline	Figure 8.76	FW2	—	Potential	Potential	Potential	Power to line valve (OHL)

Note: u/s = upstream, d/s = downstream
1 = Salmonid potential refers to potential habitat at the crossing location only. Appendix A8.14 (Watercourse Crossing Data) outlines suitability of the entire watercourse.

8.3.3.8 Fishery Value

8.3.3.8.1 Fishery Value – Desktop Review Results

421. As mentioned in Section 8.3.1.5, there are no designated salmonid waters (under the European Communities [Quality of Salmonid Waters] Regulations 1988 (S.I. No. 293/1988)) located within the study area of the Proposed Project. Atlantic salmon are discussed in detail in Section 8.3.3.3. As well as salmon, brown trout also occur in the study area. Brown trout occur in virtually every catchment in Ireland with suitable water quality and spawning grounds, and are one of the most common and recognisable fish species in Ireland. Brown trout occur as resident 'brown trout' and also as an anadromous form, the 'sea trout'. In many catchments throughout Ireland trout make extensive migrations between spawning grounds in streams and feeding grounds in lakes or larger rivers.
422. Coarse fish are essentially any freshwater fish other than salmon and trout and generally include members of the cyprinidae family (i.e. roach, dace, rudd, bream, tench), pike and perch, and stone loach, three-spined stickleback, and minnow (which are of little angling value due to their small size). Almost all coarse fish in Ireland are considered to be non-native species. However, there is evidence that pike may be native to Ireland (Pedreschi *et al.* 2014). Coarse fish in Ireland are afforded a higher level of protection in Ireland than native brown trout, with strict limits on the number and sizes of these fish that can be killed by anglers. Coarse fisheries are of significant economic value in Ireland, particularly for tourist anglers. These fisheries and coarse fish spawning areas are generally located in large lowland rivers and lakes. The River Shannon and the Grand Canal are important in this regard. In Parteen Basin, the beds of bulrush and arrowhead recorded within the RWI&PS site provide potential spawning habitat for various coarse fish species (Appendix A8.17: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2017) and Appendix A8.18: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2019)). Most coarse fish spawn in the spring between the period mid-March to mid-May. Pike commence spawning earlier in the year between mid-January up to mid-April. As macrophytes tend to die-off over winter these beds are not likely to be suitable for pike, which may preferentially use beds of stonewort which remain throughout the year.
423. The European eel is a native fish of significant ecological importance. In recent decades, this species has undergone a dramatic decline throughout its range. In response to the decline in European eel populations, European Council Regulation 1100/2007 'Establishing measures for the recovery of the stock of European Eel' has now been adopted in member states. European eel is listed as 'Critically endangered' and is now 'Red Listed' according to the publication, 'Red List No. 5: Amphibians, Reptiles & Freshwater Fish' (King *et al.* 2011). Eels have a catadromous life cycle, which means they spawn in the sea and migrate into freshwater to feed and grow. This is opposite of the life cycle of the salmon, for example. The upstream migration of eels in rivers is restricted by weirs and their obstacles. However, unlike lampreys they are able to climb over weirs. Eels have been recorded in four of the watercourses monitored by IFI for the WFD monitoring programme, that are also crossed by the Proposed Project. These include the Nenagh River (WCX016), Clodiagh River (WCX039), Lyreen River (WCX070) and the River Liffey (WCX073). In addition, the Technical Expert Group on eel (IFI 2023) indicated that silver eel (maturing adults) were being assessed by annual fishing of an index station on the Shannon in 2023 and 2024, which included monitoring sites at Killaloe eel weir, and released at the Parteen Weir. A total of 4,445kg of eel were caught at Killaloe, which is situated upstream of the RWI&PS site. Monitoring of juvenile yellow eel migrating at Parteen Regulating Weir, which is situated downstream of the RWI&PS site, was also undertaken. In 2023, the total catch recorded at the Parteen Regulating Weir was 840.1kg (IFI 2023).

424. Pollan (*Coregonus autumnalis*), a glacial relict, has been recorded at Loughs Neagh, Erne, Ree and Derg. While small populations persist in all these lakes their presence is threatened by the effects of eutrophication on their spawning areas (McCarthy 1997). A possible major threat to the pollan spawning habitat is the rapidly spreading zebra mussel.
425. Maitland (1972) mapped Pollan distribution in Ireland and stated their preference for relatively large deep lakes. Pollan spawning has never been described for the Shannon lakes, but it is assumed to be similar to that of the Lough Neagh pollan, which spawn over shallow (1 to 3m) rocky areas in December or January and hatch towards the end of February. The yellow eggs (2.1mm diameter) are deposited among gravel and stones in relatively shallow standing water and the young hatch the following March.
426. Pollan have been recorded in the Killaloe silver eel weir (normally operated during the months October to December) and also in the downstream traps operated during the months April and May to intercept salmon smolt. This suggests that there may be a time of the year when pollan migrate downstream from Lough Derg though it is not clear if this is an accidental or directional movement. They were a common bycatch in the eel weir at Killaloe approximately 30 years ago.
427. The IFI estimated that there were a total of 3,288 pollan, of which 867 (26.4%) were juveniles, present in the pelagic zone in Lough Derg (Appendix A8.16 National Research Programme Lakes 2016: Lough Derg, Inland Fisheries Ireland Report). Pollan ranged in length from 6.4cm to 35.7cm and were aged from 1+ to 6+, the dominant age class being 1+. Their distribution was mainly restricted to the deeper and southern section of the lake. The IFI note that in order to optimise management of the Lough Derg pollan population, spawning areas and times need to be identified.
428. Pollan in Lough Derg have been assigned a provisional conservation status of 'Unfavourable – Bad' and are considered impacted due to their small population size, low percentage abundance of juveniles and the presence of various pressures such as habitat modifications and species translocations. Rosell *et al.* (2004) identify roach and zebra mussel has having the potential to significantly impact on pollan populations, though projected longer-term increases in annual mean temperatures could eventually dwarf other threats and render management changes to aid conservation redundant. Even relatively small increases in annual average temperatures could have significant effects.
429. No pollan were recorded in Parteen Basin during the IFI surveys in 2016 (Appendix A8.15: National Research Programme Lakes 2016: Parteen Basin (Lower Lough Derg), Inland Fisheries Ireland Report). Parteen Basin has been assigned an ecological status of 'Good' based on the fish populations present in 2016. In a pers. comm., the late Dr. Martin O'Grady (IFI scientist for over 35 years) in a review of the IFI fish stock surveys undertaken in Lough Derg and Parteen Basin stated '*it is noteworthy that no pollan were recorded in the Parteen [Basin] Reservoir survey. This is not surprising given the artificial nature of the habitat.*'
430. Several of the watercourses within the Proposed Project (79 watercourse crossings; ranked as high or medium ecological value in Appendix A8.14: Watercourse Crossing Data) have the potential to support small fish populations dominated by species such as the three-spined stickleback, minnow and stone loach. These small fish communities are not of significant ecological importance. These populations, particularly ones dominated by sticklebacks, can be present even in small drains that have permanent water.

8.3.3.8.2 Fishery Value – Field Survey Results

431. During the aquatic surveys between 2016 and 2024, visual surveys and dip net surveys were carried out in order to assess value for fish communities and fisheries and identify potential spawning, nursing or adult habitat for salmonid and lamprey species. Of the watercourses crossed by the Proposed Project with suitable salmonid habitat, fish were recorded at 35 sites. Fish species identified included stone loach, three-spined stickleback, brown trout, minnow, Atlantic salmon, and lamprey sp. (Appendix A8.14: Watercourse Crossing Data).
432. Brown trout were recorded incidentally during dip net surveys at the sampling locations of the following watercourses during the aquatic surveys between 2016 and 2024: WCX004, WCX005, WCX012, WCX013, WCX016, WCX021, WCX027, WCX028, WCX029, WCX031, WCX034, WCX036, WCX039, WCX048, WCX056, WCX073, and WCX077. Their presence is likely to be more widespread, and most of the larger river channels in the study area are considered to be important trout fisheries, e.g. Camcor River, Figile River, Blackwater (Longwood) River, and the River Liffey (IFI 2018).
433. 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 (Appendix A8.15: National Research Programme Lakes 2016: Parteen Basin (Lower Lough Derg), Inland Fisheries Ireland Report). Of the 639 proposed crossings, eight are monitored for fish by IFI for the WFD on a three-year rolling programme (Nenagh River, Little Brosna River, Silver River, Clodiagh River, Tullamore River, Baltracey River, Lyreen River and the River Liffey). Coarse fish were recorded in all eight of these watercourses.
434. Eel was recorded on one occasion during surveys in 2017 on the Clodiagh River (WCX039). Eel (17 individuals) were also captured in Parteen Basin during field stock surveys undertaken by IFI in 2016 (Appendix A8.15: National Research Programme Lakes: Parteen Basin (Lower Lough Derg), Inland Fisheries Ireland Report). The 2016 fish stock survey was not repeated as the presence of eel in Parteen Basin is well documented. Eel are likely to be widespread in most larger watercourses and potentially in drainage ditches.

8.3.3.9 Invasive Non-Native Aquatic Species

8.3.3.9.1 Invasive Non-Native Aquatic Species – Desktop Review Results

435. A NBDC review of aquatic macroinvertebrate data within the 10km grid squares encompassing the Proposed Project was undertaken. The results showed the medium impact INNS, Jenkins' spire snail (*Potamopyrgus antipodarum*) and the high impact (Regulation S.I. 477) zebra mussel have been recorded within the 10km grid squares that encompass the Proposed Project, with a particularly high abundance in Lough Derg, upstream of the RWI&PS.
436. 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. The nature of zebra mussel settlements suggest extensive annual recruitments would continue within this region.
437. The Asian clam was 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).

438. A NBDC review of invasive non-native aquatic plant species within the 10km grid squares encompassing the Proposed Project was undertaken. The results showed the presence of six INNS, four of which are listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) (as amended), namely; curly waterweed (*Lagarosiphon major*), fringed water-lily (*Nymphoides peltata*), Nuttall's waterweed and water fern (*Azolla filiculoides*). Furthermore, one high impact (but not listed on the Third Schedule) invasive non-native aquatic plant species, Canadian pondweed/waterweed (*Elodea canadensis*), and one medium impact invasive non-native aquatic plant species, least duckweed (*Lemna minuta*), were also recorded.
439. Seven invasive non-native aquatic plant species have been recorded in the Shannon Navigation (Minchin and Boelens 2011; Minchin *et al.* 2016) and include: water fern, Canadian pondweed/waterweed, Nuttall's waterweed, water violet (*Hottonia palustris*), least duckweed (*Lemna minuta*), water soldier (*Stratiotes aloides*) and starry stonewort. These species are considered 'Low' to 'Medium Risk' INNS according to the Invasive Species Ireland National Invasive Species Database, with the exception of Nuttall's waterweed which is considered 'High Risk' (NBDC 2025b).
440. Crayfish plague is listed as one of Ireland's most INNS by Invasive Species Ireland (n.d.) (Section 8.3.3.5.1). This species is listed by 'Delivering Alien Invasive Species Inventories for Europe' (DAISIE) as among 100 of the worst INNS in Europe. All non-native crayfish, which may be carriers of the crayfish plague, are listed in Ireland on the Third Schedule Part 2 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) (as amended). However, the transfer of crayfish plague in Ireland appears to be independent of non-native crayfish spp. and may be associated with angling activity (possibly bait). To date, crayfish plague has not been recorded in any of the water bodies within the Proposed Project but has been recorded in water bodies upstream of the Proposed Project, and that flow into Lough Derg (Shannon (Upper)_120) and downstream of the Proposed Project and flow into the Lower Shannon Estuary (Deel (Newcastlewest)_140). A population of Australian crayfish (Yabby *Cherax destructor*) was found in Ireland in 2019, in a lake at a former quarry in County Cork (Sweeny *et al.*, 2022). Although this species is not a carrier of this particular plague that is currently present in Ireland, it is well accepted that the introduction of non-native species to an ecosystem can result in an abundance of ecological issues. This would put further undue pressure on Irish native white-clawed crayfish populations. There is, however, no hydrological connectivity between this lake and the Proposed Project.

8.3.3.9.2 Invasive Non-Native Aquatic Species – Field Survey Results

441. Although not an aquatic species, Himalayan balsam can inhabit riverbanks and is therefore considered herein. During the 2019 to 2024 surveys, Himalayan balsam was recorded along the Knockadromin Stream (WCX002), the River Liffey (WCX073), the Reeves Stream (WCX074), and the Kilmastulla at WCX077. This INNS was also recorded during the 2018 and 2020 surveys along a drainage ditch at WBX087. Canadian waterweed was recorded in 2018 at Daingean River (WCX048) and Esker Stream (WCX050). Himalayan balsam is a high impact INNS and is listed on the Third Schedule (Part 1) of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) (as amended).
442. The common roach (*Rutilus rutilus*) was recorded incidentally during dip net surveys on four occasions at Esker Stream (WCX049) in 2018, once at Daingean River (WCX048) in 2020, once within the Grand Canal (WBX078) in 2024 and once within the Headrace Canal (PSNWCX005) in 2024. Roach is a medium impact INNS and is also listed on the Third Schedule (Part 1) of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) (as amended). Roach are likely to be present in many slow-moving watercourses.

443. During surveys conducted in August 2021 at Lough Derg and Parteen Basin (RWI&PS), zebra mussel, quagga mussel (*Dreissena rostriformis bugensis*), starry stonewort, and Nuttall's waterweed were recorded (Appendix A8.19: Aquatic Invasive Species Survey Report). 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 (S.I. No. 477/2011) (as amended).
444. No non-native crayfish were recorded during aquatic surveys between 2016 and 2024.

8.3.4 Ornithology – Breeding Birds

445. The main findings of the breeding bird surveys carried out between 2016 and 2024 are summarised herein for each of the target species recorded within the study area of the Proposed Project. This includes results from the Breeding Bird Walkover Surveys, Breeding Woodcock Surveys, Breeding Water Bird Boat Surveys, Gull Population Counts and Vantage Point Surveys.
446. The focus of the surveys was to establish the distribution and abundance of target species which are at potential risk from impacts associated with the Proposed Project. Species sensitivity to the Proposed Project was determined using information gathered from the desktop study, consultation with relevant stakeholders, and field surveys. Sensitivity factors include one or more of the following: risk of disturbance, displacement, and species distribution within the study area.
447. A comprehensive list of all target bird species recorded within the study area is included in Appendix A8.21 (Breeding Bird Surveys Summary Report).

8.3.4.1 Breeding Birds – Desktop Review Results

448. The RWI&PS site at Parteen Basin is situated downstream of the Lough Derg (Shannon) SPA and upstream of the River Shannon and River Fergus Estuaries SPA. These designated European sites are 3km and 6km from the Proposed Project, respectively. The (breeding) special conservation interests of the Lough Derg (Shannon) SPA are cormorant and common tern. Nationally important numbers of both these species breed on the lake. Noteworthy numbers of both tufted duck and great crested grebe also breed on Lough Derg.
449. There are three SPAs which are designated for hen harrier within the potential Zol (15km) of the Proposed Project: Slievefelim to Silvermines Mountains SPA, Slieve Bloom Mountains SPA, and Slieve Aughty Mountains SPA. A 15km buffer was used as an initial screening exercise; sites within and beyond this 15km buffer were subsequently reviewed for source-pathway-receptor links. The Slievefelim to Silvermines Mountains SPA is the closest to the Proposed Project, situated 1.5km south-east.
450. In the 2022 breeding season the Slieve Aughty Mountains hen harrier population was three to five pairs. This was a decrease in the population of approximately 64% from the previous national hen harrier surveys in 2015. The breeding population within the Slievefelim to Silvermines Mountains had remained relatively stable from previous years, however in 2022, there was three to four pairs in the SPA marking an approximate 60% decline. The Slieve Bloom Mountains have shown an increasing trend from the 2015 national hen harrier surveys, but in 2022 eight to nine pairs were recorded, marking an approximately 30% decline. Overall, the species is showing a decreasing population trend nationally. The habitat in Ireland most favoured by hen harrier is heather moorland and conifer plantations (particularly second rotation forest and thicket) (Ruddock *et al.* 2024). The Proposed Project and wider surroundings contain potentially suitable habitat for this species. As hen harrier may travel up to 10km from a roost site for foraging (SNH 2016), the Slieve Bloom Mountains and Slievefelim to Silvermines Mountains SPA hen harrier populations are therefore within connectivity distance from potential supporting habitat within the Proposed Project.

451. The cutaway bog habitat in the midlands of Ireland has been shown to provide valuable habitat for breeding birds such as waders. Bord na Móna commissioned a study to survey 10 cutaway bogs in the midlands of Ireland for breeding waders (Copland 2011). Five of these cutaway bogs are located in the wider surroundings of the Proposed Project. For this study, during the breeding bird survey season of 2010 and 2011 a number of species of high conservation concern were recorded across the peatland sites in the midlands of Ireland. Of the five cutaway bogs closest to the Proposed Project, breeding was confirmed for ringed plover and lapwing and was considered probable for black-headed gull, snipe and redshank.
452. In summary, the desktop study found local SPAs host water bird populations and hen harrier which are present in nationally important numbers in some instances, therefore breeding bird surveys were required to establish a population baseline to facilitate robust quantitative assessments of any potential impacts associated with the Proposed Project. Similarly, the wider surroundings of the Proposed Project may contain supporting habitat for several species of conservation concern, therefore field surveys were conducted to investigate this possibility.
453. While reviewing available information on breeding barn owls in Ireland, a report by Lusby *et al.* (2022) highlighted areas of high barn owl breeding activity in proximity to the Zone of Influence (Zoi) for the Proposed Project in County Offaly, based on a 2021 national barn owl survey. To better understand the potential for breeding barn owls within the Zoi of the Proposed Project, a data request was submitted to BWI. Following this engagement, BWI confirmed they could provide breeding records for use solely in informing the ecological baseline and impact assessment, with the condition that specific location data remain confidential.
454. Despite initial discussions, the requested data had not been received at the time of writing this chapter. The absence of this dataset prohibited the ability to incorporate BWI's most recent records into the assessment. Thus, the evaluation presented herein is based primarily on published sources of information, as well as the results of the baseline surveys undertaken for the Proposed Project. This is not considered to be a limitation as multiple years of survey data have been acquired for the Proposed Project.
455. Additionally, an updated request was made to NPWS in 2025, which provided records on some protected breeding bird species, namely the barn owl and golden plover. The data received included a small number of records for the species; however, the majority of these were historic and considered outdated and all the records occurred outside the Zoi of the Proposed Project.

8.3.4.2 Breeding Birds – Field Survey Results

8.3.4.2.1 Parteen Basin, RWI&PS and the Route of the Treated Water Pipeline

8.3.4.2.1.1 Key Species of Conservation Significance

456. Key species of conservation significance are target species which are determined to be most at risk from the Proposed Project, due to their ecology (e.g. ground nesters), their global and Irish conservation status, or those which are more sensitive to disturbance or displacement. The key species of conservation significance recorded during breeding bird surveys for the Proposed Project are summarised in Table 8.43 and detailed results are provided in Appendix A8.21 (Breeding Bird Surveys Summary Report).

Table 8.43: Summary of Breeding Bird Survey Results for Key Species of Conservation Significance at the RWI&PS and Along the Route of the Treated Water Pipeline Between 2016 and 2024

Key Species of Conservation Significance	Conservation Status	Summary of Breeding Bird Survey Results
Barn owl	Red Listed (BoCCI)	There are an estimated 562 to 702 breeding pairs of barn owl in Ireland (Expert Opinion: BWI, NPWS 2019e). This species breeds primarily in the cavities of ruined structures, such as derelict buildings and castles. Although scarce in Ireland, the south and midlands of the country is a stronghold for the species. Its breeding population has undergone both a long-term and short-term decline in the last 25 years (Gilbert <i>et al.</i> 2021). Barn owl was recorded infrequently during the breeding bird surveys between 2016 and 2024. Possible breeding bird activity was recorded on four occasions during the 2022 and the 2024 surveys. In addition, an incidental record of barn owl nesting in a tree cavity within the boundary of the Proposed Project was observed while conducting a bat survey in 2025. The observation was recorded at a location in the townland of Ballyhugh or Springfield County Offaly, between Chainage TWC – 19600 and Chainage TWC – 19900. A pair of adults were observed at this location, while chicks could be heard calling from within the cavity.
Black-headed gull	Amber Listed (BoCCI)	An estimated 7,810 breeding pairs of black-headed gull are present in Ireland (Cummins <i>et al.</i> 2019). This species mainly breeds in wetlands, but it is adaptable in its habitat requirements in Ireland. Small numbers of the Irish population are thought to migrate to southern Europe in winter, but most appear to remain in Ireland. The lake at Lough Ourna, County Tipperary annually hosts a large colony of breeding black-headed gulls. A maximum site count of 382 individuals was recorded in 2022, while a minimum of 80 pairs were observed as probable or confirmed breeding in 2021. This constitutes a flock of national importance (>61 pairs constitute a flock of national importance). In 2022 an additional colony was recorded on a recently re-wetted bog in Gorteenkeel County Offaly. Several pairs and chicks were recorded on small islands in newly formed lakes/ponds. In 2024, the number of breeding colony locations increased to four. The two additional colonies were also found on recently re-wetted bogs in Ballinvalley and Ballycon County Offaly.
Coot	Amber Listed (BoCCI)	An estimated 3,462 pairs of coot are present in the Republic of Ireland (ROI) (NPWS 2019E). Coot nest in large shallow water bodies that are rich in nutrients and have abundant bottom vegetation for food and some emergent vegetation for nest anchorage. Coot were limited in their distribution across the Proposed Project study area during the breeding bird seasons between 2016 and 2024. They were recorded at Parteen Basin, Drumminascart and Lough Ourna in County Tipperary and scarcely recorded elsewhere. Breeding was confirmed during 2016, 2017, 2018, 2019, 2021 and 2024. The majority of these records related to pairs recorded on nests or with chicks. No evidence of breeding was recorded in 2022.
Curlew	Red Listed (BoCCI)	An estimated 138 breeding pairs of curlew are present in the ROI. This species is now thought to be a very rare breeder of semi-improved and unimproved rough grassland, lowland wet grasslands, moorland, heath and bog in Ireland. The breeding distribution is mostly confined to important clusters or strongholds in Counties Kerry, Galway, Kildare, Roscommon, Mayo, Leitrim, Monaghan and Donegal (O'Donoghue <i>et al.</i> 2019). The curlew breeding population has experienced a significant short-term and long-term decline in the past 25 years (Gilbert <i>et al.</i> 2021). Curlew was recorded infrequently and in low numbers during the breeding bird season surveys between 2016 and 2024, often as single records which were observed feeding or commuting and not recorded again in follow-up visits. Breeding was not confirmed for this species in any of the breeding bird seasons between 2016 and 2024. Return visits to sites of positive curlew recordings did not detect curlew in residence at these locations. Given the lack of curlew sightings within the breeding bird seasons (2016 to 2024), it is considered curlew are not dependent on the habitats within the Proposed Project for foraging or breeding.
Great crested grebe	Amber Listed (BoCCI)	An estimated 2,500 pairs of great crested grebe are present in the ROI (NPWS 2019e). Great crested grebes breed on large, shallow eutrophic loughs, and along canals and slow-flowing rivers; wetlands with emergent vegetation bordered by open water are generally selected. Great crested grebe were limited in their distribution during the breeding bird seasons between 2016 and 2024. They were only recorded at Parteen Basin and Lough Ourna in County Tipperary and were scarcely recorded elsewhere. Breeding was confirmed at Lough Ourna during 2016, 2017, 2018, 2019, 2021 and 2022; the majority of these records related to a single pair recorded on a nest.

Key Species of Conservation Significance	Conservation Status	Summary of Breeding Bird Survey Results
Hen harrier	Annex I EC Birds Directive, Amber Listed (BoCCI)	There were an estimated 85 to 106 breeding pairs of hen harrier recorded during a study in Ireland in 2022. This was a decline of 33% in the total population since the previous surveys (Ruddock <i>et al.</i> 2024). There are three SPAs which are designated for hen harrier within 15km of the Proposed Project; Slievefelim to Silvermines Mountains SPA, Slieve Bloom Mountains SPA and Slieve Aughty Mountains SPA. The Slievefelim to Silvermines Mountains SPA is the closest to the Proposed Project, situated 1.5km south-east. In the 2022 breeding season the Slieve Aughty Mountains hen harrier population was three to five pairs. This was an approximate decrease in the population of 64% from the previous 2015 national hen harrier survey. The breeding population within the Slievefelim to Silvermines Mountains has remained relatively stable, however in 2022, there was three to four pairs in the SPA marking an approximate 60% decline. The Slieve Bloom Mountains had shown an increasing trend from the 2015 national hen harrier surveys, but in 2022 eight to nine pairs were recorded, marking an approximately 30% decline. Overall, the species is showing a decreasing population trend nationally. The habitat in Ireland most favoured by hen harrier is heather moorland, scrub and conifer plantations (particularly second rotation forest and thicket) (Ruddock <i>et al.</i> 2024). The Proposed Project and wider surroundings contain potentially suitable habitat for this species. As hen harrier may travel up to 10km from a nest site for foraging (SNH 2016), the Slieve Bloom Mountains and Slievefelim to Silvermines Mountains SPA hen harrier populations are therefore within connectivity distance from potential supporting habitat within the Proposed Project. Hen harrier was rarely recorded during the breeding bird surveys between 2016 and 2024. The species was only recorded twice; once in 2018 near Timahoe, County Kildare and a second in 2019 near Cloughjordan, County Tipperary. No evidence of breeding hen harrier was recorded during the breeding bird surveys between 2016 and 2024.
Kestrel	Red Listed (BoCCI)	The breeding population of kestrel is unknown in Ireland, but an estimated 13,500 individuals are present within the ROI (Lewis <i>et al.</i> 2019a). This is a widely distributed species in Ireland, foraging and breeding in the majority of open habitats. Kestrels are largely sedentary in Ireland, only migrating to lower latitudes during the winter months. Kestrel was regularly recorded during the breeding bird seasons between 2016 and 2024. The majority of these records related to commuting, hunting or roosting individuals. Breeding was confirmed on two occasions only in 2018, one recorded at Derrycreeb County Kildare where an adult was observed carrying prey in suitable breeding habitat and one at Ballyanny County Tipperary when a pair of adults were observed mobbing a buzzard in suitable breeding habitat. No nest sites were located at either of these locations and it is unknown if the recorded birds bred successfully.
Kingfisher	Amber Listed (BoCCI)	An estimated 1,031 pairs of kingfisher are present in the ROI (Cummins <i>et al.</i> 2010; NPWS 2019e). This species is typically sedentary but may undergo short migrations to the coast during cold weather. This species is widely distributed along canals and rivers of Ireland. Their distribution is largely dependent on the availability of soft sediment banks for breeding. Kingfisher were recorded to have bred at one location during the 2016 surveys and at two locations during the 2017 surveys. For both these records it is unknown if breeding was successful. In follow up visits in the following survey seasons up to 2024 no breeding activity was recorded at these sites again; any kingfisher records during these times related only to commuting individuals. In 2022, there were fourteen records of kingfisher; five of these were related to breeding activity, where kingfisher records were located near suitable habitat or where old nest sites were found.
Lapwing	Red Listed (BoCCI)	An estimated 620 breeding pairs of lapwing are present in the ROI (NPWS 2019e). It is unknown if breeding birds within Ireland are resident. This species is thinly distributed across the country as a breeding species. Its breeding population has experienced a significant short-term and long-term decline in the past 25 years (Gilbert <i>et al.</i> 2021). Lapwing were probable or confirmed to have bred along the Proposed Project during the 2016, 2017, 2018, 2019, 2021, 2022 and 2024 breeding seasons. All behavioural observations associated with breeding (display flights, alarm calling and/or a pair holding a territory) were noted in peatland habitats. These breeding lapwing records were principally confined to the large bog complexes along the Proposed Project in Counties Offaly and Kildare.
Mallard	Amber Listed (BoCCI)	Mallard was frequently recorded during the 2016 to 2024 breeding seasons, often on large water bodies or ponds and near wetland areas along the Proposed Project. Breeding was confirmed at a number of locations, the majority of which were recorded on large water bodies such as Parteen Basin and Lough Ourna, County Tipperary, but also breeding on a number of pool/ponds within bogs in Counties Offaly and Kildare. There was a maximum count of 66 breeding records in 2024.
Mute swan	Amber Listed (BoCCI)	An estimated 3,500 pairs of breeding mute swan are present in Ireland (NPWS 2019e). Mute swan breed on lakes, ponds, rivers and slow-moving water bodies, nesting along banks and islands on mounds of vegetation. Mute swan were limited in their distribution during the breeding bird season between 2016 and 2024. They were only recorded breeding at Parteen Basin, County Tipperary and were scarcely recorded breeding elsewhere. Other breeding records outside of Parteen Basin were confined to other large and permanent water bodies such as those found in Drumminascart and Lough Ourna in County Tipperary. There was a maximum count of 46 breeding records in 2022.

Key Species of Conservation Significance	Conservation Status	Summary of Breeding Bird Survey Results
Peregrine falcon	Annex I EC Birds Directive	An estimated 515 breeding pairs of peregrine falcon are thought to be present in the ROI (NPWS 2019e). This species is mainly resident in Ireland. Peregrine falcon is widely distributed throughout the country, although they are not considered common. Peregrine falcon was recorded infrequently during the breeding bird surveys between 2016 and 2024. The majority of records relate to commuting or hunting individuals where no breeding activity was recorded. One breeding pair in 2021, 2022 and 2024 were observed at the Edenderry Power Station near Cushaling, County Offaly; breeding was recorded at this site in the past.
Ringed plover	Amber Listed (BoCCI)	An estimated 1,045 breeding pairs of ringed plover are present in the ROI (Balmer <i>et al.</i> 2013). Breeding common ringed plover are typically associated with coastal shingle beaches and occasionally inland lakes; however, in Ireland they have been associated with areas of cutover raised and blanket bog in the midlands and the west coast (Copland <i>et al.</i> 2008; Copland 2011). Ringed plover was rarely recorded during the breeding seasons from 2016 to 2019, but sightings increased from 2021 to 2024. In May 2021, a pair was observed in suitable breeding habitat on cutover raised bog in County Offaly, but they were not seen on a follow-up visit in June. Possible breeding attempts continued in 2022 at the same location, now a rewetted Bord na Móna cutover habitat. Breeding was also recorded at two new locations, including a confirmed case in County Offaly and a suspected case in County Kildare. The 2024 season saw a peak in records, with 14 sightings across three locations, including confirmed breeding at Ballinvalley and Ballycon, County Offaly, where adults were observed with eggs and chicks.
Sand martin	Amber Listed (BoCCI)	The breeding population of sand martin is unknown in Ireland, but an estimate of 460,000 individuals are present within the ROI (Lewis <i>et al.</i> 2019a). Sand martins are a summer visitor to Ireland, often arriving in March. They spend the winter in sub-Saharan Africa. They are a widespread species which are often associated with riparian habitats. This species typically breeds colonially; usually nesting in sandy or mud cliffs, quarries, riverbanks and cutaway peat banks. Sand martin was regularly encountered throughout the Proposed Project. The largest congregations of foraging individuals were associated with large water bodies: Parteen Basin and Lough Ourna, County Tipperary. Breeding was either confirmed, probable or possible in the years 2016, 2017, 2018, 2019, 2021, 2022 and 2024, with records confined to Counties Tipperary and Offaly. The distribution of this species is largely dependent on habitat availability such as soft sediment banks. During the breeding bird surveys, these habitats were present in sand banks in County Tipperary and the peaty banks and active quarries in County Offaly.
Snipe	Red Listed (BoCCI)	An estimated 4,275 breeding pairs of snipe are present in ROI (Lauder and Donaghy 2008). This species is thought to be widely distributed throughout the country, but snipe are a difficult species to survey owing to their secretive nature and crepuscular habit (active in twilight). As a result, this species is typically under-recorded. The most common observation of this species was of birds flying from cover as a result of local disturbance, usually flushed by surveyors. The majority of the remaining breeding season observations involved chipping or drumming individuals. Birds present in Ireland are resident or migrants from Scandinavia and Britain. Snipe were recorded regularly in wet grassland and peatland habitats along the Proposed Project. Records of breeding snipe were distributed across eight main areas along the Proposed Project: Parteen Basin in County Tipperary, Island, Rathlumber, Cushaling and Lullybeg to Ticknevin in County Offaly and Timahoe East and Derryvarroge in County Kildare. This species is a probable breeder within the Proposed Project, although no nest sites were located for the species. In 2019, there was a significant decrease in snipe observations within the Proposed Project with only one breeding record and four non-breeding observations. It is unknown what the specific reasoning for this is, but the species has been recorded undergoing significant short and long-term declines in Ireland (Gilbert <i>et al.</i> 2021). In 2021, and 2022 the number of recordings increased with 21 breeding records noted in 2021 and 23 in 2022.
Woodcock	Red Listed (BoCCI)	Population estimates for breeding woodcock in Ireland are unknown. This species breeds in woodlands of all types. Woodcock has undergone long-term declines of greater than 70% in its breeding range (Gilbert <i>et al.</i> 2021). Surveying woodcock breeding numbers is notoriously difficult. Counts of passes by roding woodcock provide the only feasible method of recording breeding woodcock populations, but their interpretation has been hindered by the fact that they represent multiple registrations of an unknown number of males. Within the Proposed Project, woodcock was confined to surveyed sites of Incha Beg County Tipperary, and Derrinturn, Cloona and Derrycrib, County Kildare. This species is considered a probable breeder within the Proposed Project, although no nest sites were located for the species.
Grey wagtail	Red Listed (BoCCI)	The breeding population of grey wagtail is unknown in Ireland, but an estimated 50,770 individuals are present within the ROI (Lewis <i>et al.</i> 2019a). Grey wagtail is found along fast-flowing, rocky streams and rivers in both upland and lowland habitats in and around water bodies with a strong selection for riparian shingle (Ormerod and Tyler 1991). Feeding on ground and aerial invertebrates, the population is prone to significant losses when prolonged periods of sub-zero temperatures limit availability of terrestrial and aquatic insects. Grey wagtail was recorded infrequently, often on or near watercourses along the Proposed Project. Records often related to commuting or feeding individuals; however, breeding was confirmed or assumed probable in 2017 near Killaloe Bridge County Clare and in 2018 near Killurane County Tipperary.

Key Species of Conservation Significance	Conservation Status	Summary of Breeding Bird Survey Results
Meadow pipit	Red Listed (BoCCI)	The breeding population of meadow pipit is unknown in Ireland, but an estimate of >1,350,000 individuals are present within the ROI (Lewis <i>et al.</i> 2019a), where they are associated with open countryside such as rough grasslands and both lowland and upland bogs and grass moors. Meadow pipit were regularly encountered during the breeding bird seasons between 2016 and 2024. Records were often located in wet grassland habitats and cutover bogs along the Proposed Project. No breeding was confirmed for these ground nesting birds during the survey seasons, but breeding was probable and possible during all survey years.
Yellowhammer	Red Listed (BoCCI)	The breeding population of yellowhammer is unknown in Ireland, but an estimate of over 217,000 individuals are present within the ROI (Lewis <i>et al.</i> 2019a). Yellowhammer has a close association with cereal farming (Krykos <i>et al.</i> 1998) and winter stubbles (Whittingham <i>et al.</i> 2005) where it has a high dependency on the ready supply of cereal and weed seeds for food. As a result its breeding population is largely confined to the south and east of Ireland, where arable farms are most common. Yellowhammer was recorded frequently during the breeding bird season between 2016 and 2024. No breeding activity was confirmed during the survey period, but the species was often recorded within suitable breeding habitat or males heard calling indicating a possible breeding status. During 2016 and 2017 yellowhammer records were largely confined to the east of the Proposed Project and largely associated with areas where cereal crops were in cultivation. In the following years, yellowhammer were recorded more evenly across the Proposed Project and found in a wider variety of agricultural habitats.

8.3.4.2.1.2 Other Species of Low Conservation Significance

457. Other species of low conservation significance are target species which are determined to be less at risk from potential impacts associated with the Proposed Project, as they have a more favourable conservation status, were rarely recorded during surveys, or are not thought to be dependent on the area for breeding or feeding. Other species of low conservation significance recorded during breeding bird surveys for the Proposed Project are summarised in Table 8.44 and detailed results are provided in Appendix A8.21 (Breeding Bird Surveys Summary Report).

Table 8.44: Summary of Breeding Bird Survey Results for Other Species of Low Conservation Significance at the RWI&PS and Along the Route of the Treated Water Pipeline Between 2016 and 2024

Other Species of Low Conservation Significance	Conservation Status	Summary of Breeding Bird Survey Results
Black-tailed godwit	Red Listed (BoCCI)	Black-tailed godwit was recorded rarely during breeding bird surveys. They were recorded once during the 2022 breeding season; at Lough Ourna County Tipperary along the route of the Treated Water Pipeline from the WTP to the BPT, where a flock was recorded feeding and likely on migration. No evidence of breeding black-tailed godwit was recorded during any of the survey seasons between 2016 and 2024.
Buzzard	Green Listed (BoCCI)	An estimated 1,940 pairs of buzzard are present in the ROI (NPWS 2019e). Buzzard bred in Ireland until the beginning of the 19th century when numbers fell dramatically, due to persecution followed by their subsequent disappearance as a breeding bird by the late 19th century. In 1933, a pair bred in Antrim and by the 1950s four pairs were breeding in Northern Ireland (Hutchinson 1989). The species has since spread southwards and is likely present in all counties in Ireland. Buzzard was recorded regularly during the breeding bird seasons between 2016 and 2024. The majority of records related to commuting, hunting or soaring birds. No confirmed breeding or nest sites were recorded over the survey period from 2016 to 2024; however in 2019, 2021, and 2022 a number of birds were recorded as possible or probable breeders given their activity or location within or near suitable breeding habitat. These possible or probable breeding records were confined to Counties Offaly and Kildare. In addition, an incidental record of buzzard nesting in a small woodland within 60m of the boundary of the Proposed Project was observed in the townland of Derryvarroge County Kildare, between Chainage TWC – 26900 and Chainage TWC – 27300, while conducting a multidisciplinary walkover survey in 2025. An adult was observed on a nest at this location.
Common sandpiper	Amber Listed (BoCCI)	An estimated 1,850 breeding pairs of common sandpiper are present in the Republic of Ireland (ROI) (NPWS 2019e). Common sandpiper is typically associated with lake edge and riparian habitats (Stroud <i>et al.</i> 1987) but has been commonly encountered on cutaway, raised and blanket bogs in Ireland (Copland <i>et al.</i> 2008; Copland 2011). No evidence of breeding common sandpiper were recorded during the breeding bird seasons between 2016 and 2024; the infrequent records only related to commuting or feeding individuals, although suitable habitat can be found along the Proposed Project.
Common tern	Amber Listed (BoCCI)	Common tern were recorded infrequently during the breeding bird surveys between 2016 and 2024. They were only recorded to the north and south of Parteen Basin during the 2019 and 2020 breeding season. No evidence of breeding common tern was recorded during any of the survey seasons between 2016 and 2024.
Cormorant	Amber Listed (BoCCI)	Cormorant were consistently recorded at Parteen Basin and were infrequently recorded elsewhere during the 2016 to 2024 breeding seasons. Cormorant were located throughout Parteen Basin and were recorded feeding, roosting, and commuting. No evidence of breeding was recorded during any of the survey periods. A known breeding colony occurs within the Lough Derg Shannon SPA to the north of lake, but this located approximately 36km north of the Proposed Project

Other Species of Low Conservation Significance	Conservation Status	Summary of Breeding Bird Survey Results
Golden plover	Red Listed (BoCCI)	Golden plover was rarely recorded during breeding bird surveys between 2016 and 2024, and were only recorded in 2021 and again in 2022. In April 2021, the single golden plover was recorded feeding on exposed peat near Ballycon, County Offaly, and was likely to be on migration as it was not found in suitable breeding habitat. In 2022, 220 individuals were recorded. These golden plover were likely to be on migration as they were not found in suitable breeding habitat.
Goshawk	Amber Listed (BoCCI), Breeding Rarity	In May 2016 a goshawk juvenile was recorded at Carrigatogher, County Tipperary. A goshawk recorded with juvenile plumage in early May, such as this one, is likely to be a bird in its second (calendar) year, which has not yet developed adult markings. The habitat at this location was not considered to be suitable for breeding goshawk, nor was it recorded in the area in subsequent visits. Goshawk was not recorded again in the following survey season.
Grey heron	Green Listed (BoCCI)	An estimated 3,087 pairs of grey heron are present in the ROI (NPWS 2019e). Grey heron was recorded regularly during the breeding bird seasons between 2016 and 2024. The majority of records related to commuting or feeding birds. No confirmed breeding or nest sites were recorded.
Grey partridge	Red Listed (BoCCI)	Grey partridge has experienced a long-term contraction (up to 90%) of its range throughout Ireland. The grey partridge range is now restricted to Lough Boora, County Offaly (north of the Proposed Project). A dedicated project to increase their numbers is being run at this location. The species was only recorded in 2016 and on two occasions. Observations related to individuals and there was no evidence of breeding occurring. The species was not recorded again in the following years.
Greylag	Feral Population	An estimated 2,000 pairs of greylag goose are present in the ROI (NPWS 2019e). Greylag goose was recorded occasionally during the breeding bird seasons between 2016 and 2024. The majority of records related to commuting or feeding birds, although some breeding was confirmed at Parteen Basin, County Tipperary, where goslings were recorded.
Herring gull	Amber Listed (BoCCI)	Herring gull was recorded rarely during the breeding bird surveys between 2016 and 2024. There were eight records of herring gulls foraging and commuting around Parteen in 2019 and two records during the 2022 breeding bird season, but no evidence of breeding was recorded.
Lesser black-backed gull	Amber Listed (BoCCI)	Lesser black-backed gull was recorded frequently during the breeding bird surveys. The majority of records were recorded at Parteen Basin, County Tipperary/Clare and around Drehid landfill at Timahoe, County Kildare. There was no evidence of breeding lesser black-backed gull recorded during the survey seasons between 2016 and 2024.
Little grebe	Green Listed (BoCCI)	An estimated 6,875 pairs of little grebe are present in the ROI (NPWS 2019e). Little grebe was recorded regularly during the breeding bird seasons between 2016 and 2024. The majority of records were related to feeding birds, although some breeding was observed. This included a number of possible and probable breeding status and some confirmed nests. Generally breeding records were confined to large water bodies and ponds in wetland areas and bogs in Counties Offaly and Kildare.
Merlin	Amber Listed (BoCCI)	An estimated 200 to 400 pairs of merlin are thought to be present in the ROI (NPWS 2019e). The species is typically found near upland areas favouring open moors and peatland habitats, and in recent times and due to landscape changes the species has adapted to nesting in and near upland forested areas (Lusby <i>et al.</i> 2017). Merlin was only observed once during the breeding bird seasons between 2016 and 2024, in June 2021 on a cutover raised bog near Cushaling, County Offaly. This adult was only recorded briefly commuting through the area and was not seen in follow up visits. No evidence of breeding activity was recorded.
Redshank	Red Listed (BoCCI)	An estimated 300 breeding pairs of redshank are present in the ROI (NPWS 2019e). Redshank breeds in a wide variety of wetland habitats and often in association with agricultural lands including lowland wet meadows, floodplains, bogs, marshes and coastal saltmarshes. No breeding redshank were recorded during the breeding bird seasons between 2016 and 2024. Records were infrequent and only related to individuals which were observed feeding or commuting and were not recorded again in follow-up visits. Records were confined to cutover bog areas in County Offaly and Kildare or along lake margins (Parteen Basin, County Tipperary/Clare).

Other Species of Low Conservation Significance	Conservation Status	Summary of Breeding Bird Survey Results
Shoveler	Red Listed (BoCCI)	Shoveler were rarely recorded during the breeding bird seasons between 2016 and 2024. In 2021 shoveler was recorded in Lough Ourna County Tipperary. No evidence of breeding was recorded and the observation related to feeding and roosting individuals, which were not recorded again in follow-up visits.
Sparrowhawk	Green Listed (BoCCI)	The breeding population of sparrowhawk is unknown in Ireland, but an estimated 11,800 individuals are present within the ROI (Lewis <i>et al.</i> 2019a). The sparrowhawk is one of the most common and widespread raptor species in Ireland. In areas where it is absent, it is due to a lack of suitable woodland or scrub for breeding (Gibbons <i>et al.</i> 1993). Adults are sedentary in Ireland. Sparrowhawk were recorded frequently during the breeding bird seasons between 2016 and 2024. The majority of these records related to hunting, commuting or roosting individuals, however breeding was confirmed on three occasions: once in 2018 when an adult was observed feeding a fledgling near Dalgan, County Offaly, once in 2019 when an adult was observed in suitable breeding habitat carrying prey and visiting a possible nest site near Derrycreeb, County Kildare, and once in 2022 near Dredid County Kildare. Also in the area was an active plucking post, which is typical of the species.
Swift (<i>Apus apus</i>)	Red Listed (BoCCI)	Swift is a Red Listed species due to historic and short-term breeding declines. They would not be significantly impacted by the Proposed Project, as they primarily nest in buildings or man-made structures (Lewis <i>et al.</i> , 2019a). Since no buildings with swift colonies would be removed or disturbed as a result of the Proposed Project, there is no potential for likely significant effects on individuals or their populations.
Teal	Amber Listed (BoCCI)	Teal were rarely recorded during the breeding bird seasons between 2016 and 2024 and the majority of records were recorded near areas of open water or ponds. In 2021 teal was recorded in Timahoe in County Kildare. No evidence of breeding was recorded and the observation related to feeding and roosting individuals, which were not recorded again in follow-up visits.
Tufted duck	Amber Listed (BoCCI)	A tentative estimate of approximately 800 pairs of tufted duck are present in the ROI (NPWS 2019e). In Ireland tufted duck show a preference for large open lakes in lowland areas, where nests are built in waterside vegetation. Many nest in close proximity to each other. Tufted duck were rarely recorded outside of Parteen Basin during the breeding bird seasons between 2016 and 2024. No breeding activity was recorded outside of Parteen Basin, with any records relating to commuting, feeding, or roosting individuals or small flocks which were not recorded in follow-up visits.
Goldcrest (<i>Regulus regulus</i>) Greenfinch (<i>Carduelis chloris</i>) House martin (<i>Delichon urbicum</i>) House sparrow (<i>Passer domesticus</i>) Linnet (<i>Carduelis cannabina</i>) Spotted flycatcher (<i>Muscicapa striata</i>) Starling (<i>Sturnus vulgaris</i>) Swallow (<i>Hirundo rustica</i>) Willow warbler (<i>Phylloscopus trochilus</i>)	Amber Listed (BoCCI)	A full list of all other Amber Listed species recorded during surveys can be found in Section 3.2 of Appendix A8.21 (Breeding Bird Summary Report). While some of these species are likely breeding within or near the Proposed Project, they were not recorded in detail as they do not meet the key target species criteria outlined in this assessment and Appendix 8.21. Species such as house martin, house sparrow, starling, and swallow are unlikely to be significantly affected by the Proposed Project due to their nesting ecology, which primarily involves buildings or other man-made structures. Meanwhile, species such as goldcrest, greenfinch, linnet, spotted flycatcher, and willow warbler have stable or slightly declining national populations, according to Lewis <i>et al.</i> (2019a). Any potential impacts from the Proposed Project are not expected to result in likely significant effects on these populations.

Other Species of Low Conservation Significance	Conservation Status	Summary of Breeding Bird Survey Results
Blackbird (<i>Turdus merula</i>) Blackcap (<i>Sylvia atricapilla</i>) Blue tit (<i>Cyanistes caeruleus</i>) Bullfinch (<i>Pyrrhula pyrrhula</i>) Chaffinch (<i>Fringilla coelebs</i>) Chiffchaff (<i>Phylloscopus collybita</i>) Coal tit (<i>Periparus ater</i>) Cuckoo (<i>Cuculus canorus</i>) Dipper (<i>Cinclus cinclus</i>) Dunnock (<i>Prunella modularis</i>) Goldfinch (<i>Carduelis carduelis</i>) Grasshopper warbler (<i>Locustella naevia</i>) Great tit (<i>Parus major</i>) Great Spotted Woodpecker (<i>Dendrocopos major</i>) Hooded crow (<i>Corvus cornix</i>) Jackdaw (<i>Corvus monedula</i>) Jay (<i>Garrulus glandarius</i>) Little egret (<i>Egretta garzetta</i>) Long-tailed tit (<i>Aegithalos caudatus</i>) Magpie (<i>Pica pica</i>) Mistle thrush (<i>Turdus viscivorus</i>) Moorhen (<i>Gallinula chloropus</i>) Pheasant (<i>Phasianus colchicus</i>) Pied wagtail (<i>Motacilla alba</i>) Raven (<i>Corvus corax</i>) Redpoll (<i>Carduelis flammea</i>) Reed bunting (<i>Emberiza schoenichus</i>) Robin (<i>Erithacus rubecula</i>) Rook (<i>Corvus frugilegus</i>) Sedge warbler (<i>Acrocephalus schoenobaenus</i>) Siskin (<i>Carduelis spinus</i>) Song thrush (<i>Turdus philomelos</i>) Stonechat (<i>Saxicola torquatus</i>) Water rail (<i>Rallus aquaticus</i>) Whitethroat (<i>Sylvia communis</i>) Woodpigeon (<i>Columba palumbus</i>) Wren (<i>Troglodytes troglodytes</i>)	Green Listed (BoCCI)	A full list of all other Green Listed species recorded during surveys can be found in Section 3.2 of Appendix A8.21 (Breeding Bird Summary Report). While some of these species are likely breeding within or near the Proposed Project, they were not recorded in detail as they do not meet the key target species criteria outlined in this assessment and Appendix A8.21. The national and international populations of these species are stable or increasing, or they have a widespread range and diverse habitat preferences.

8.3.4.2.2 38 kV Uprate Works

8.3.4.2.2.1 Key Species of Conservation Significance

458. Key species of conservation significance are target species which are determined to be most at risk from the Proposed Project, due to their ecology, their global and Irish conservation status; or species that are more at risk of collisions with OHLs, or more sensitive to disturbance or displacement. The key species of conservation significance recorded during breeding bird surveys for the Proposed Project are summarised in Table 8.45 and detailed results are provided in Appendix A8.21 (Breeding Bird Surveys Summary Report).

Table 8.45: Summary of Breeding Bird Survey Results for Key Species of Conservation Significance at the 38 kV Uprate Works Between 2019 and 2024

Key Species of Conservation Significance	Breeding Conservation Status BoCCI	High/ Medium Risk Species (EirGrid 2020)	Summary of Breeding Bird Survey Results
Black-headed gull	Amber Listed BoCCI	Low	Black-headed gulls were recorded frequently during the breeding bird seasons between 2019 and 2024 during VP surveys at O'Briensbridge, along the Lower River Shannon. A total of 189 flights were recorded over the survey period, nearly all of which related to individuals or flocks (up to 22 individuals in a flock) commuting upstream of downstream along the River Shannon. All of these flights were recorded above and below the existing OHLs.
Common gull	Amber Listed BoCCI	Low	Common gull was recorded once at Kildoorus during the 2020 breeding season. It was recorded commuting upstream along the river and flew above the existing OHLs.
Coot	Amber Listed BoCCI	High	Coot were infrequently observed during VP surveys at O'Briensbridge. No flights were recorded. Birds, consisting of one or two individuals, were observed foraging on the water.
Cormorant	Amber Listed BoCCI	High	Cormorant was one of the most frequently recorded species throughout the breeding bird surveys along the Lower River Shannon near the existing OHLs between 2019 and 2024, with a total of 382 flights recorded. The vast majority of these flights were birds observed flying high over the existing OHLs. It is considered likely that the local population use both Parteen Basin and the Shannon Estuary for feeding and roosting.
Curlew	Red Listed BoCCI	Medium	Curlew were recorded infrequently during the breeding bird seasons between 2019 and 2024 during VP surveys at O'Briensbridge, along the Lower River Shannon. Observations were related to single or small flocks of birds, all of which flew under or over the existing OHLs. Observations of curlew were recorded in May and June, however, given the lack of suitable breeding habitat, the activity of the birds (commuting along the river) and the lack of observations, it is not thought that curlew are dependent on this area for breeding. Curlew were not recorded during Breeding Bird Walkover Surveys for lowland waders, which were only conducted along the 38 kV Uprate Works during the 2019 breeding season.
Grey wagtail	Red Listed BoCCI	Low	Grey wagtail were rarely recorded during the breeding bird seasons between 2019 and 2024 during VP surveys at O'Briensbridge, along the Lower River Shannon. A pair of Grey wagtail was recorded at O'Briensbridge during VP surveys in 2019. It is considered that this pair was likely to have bred locally.

Key Species of Conservation Significance	Breeding Conservation Status BoCCI	High/ Medium Risk Species (EirGrid 2020)	Summary of Breeding Bird Survey Results
Herring gull	Amber Listed BoCCI	Low	Herring gull were infrequently observed during VP surveys at O'Briensbridge. The vast majority of VP surveys recorded commuting herring gull flying throughout the viewshed. The majority of these flights were of birds commuting towards Parteen Basin or in the direction of the Shannon Estuary without landing in the study area.
Kestrel	Red Listed BoCCI	Low	Kestrel were observed frequently during the breeding bird seasons between 2019 and 2024 during VP surveys at O'Briensbridge, along the Lower River Shannon. Often in pairs, it is thought that breeding is probable, although there was no suitable habitat identified in the area within and surrounding the 38 kV Uprate Works. It is unknown if the frequently recorded pair of kestrel bred in the area or if they were successful.
Kingfisher	Amber Listed BoCCI	Low	Kingfisher was rarely recorded during the breeding bird seasons between 2019 and 2024 during VP surveys at O'Briensbridge, along the Lower River Shannon. The limited records for this species only related to individuals commuting across the River Shannon. This species is typically confined to the margins of water bodies, where it finds both feeding and roosting opportunities. Kingfisher were not recorded during the Breeding Bird Walkover Surveys for lowland waders.
Lapwing	Red Listed BoCCI	Medium	Lapwing were recorded rarely during the breeding bird seasons between 2019 and 2024 during VP surveys at O'Briensbridge, along the Lower River Shannon. This species was recorded once in April 2019 when a number of birds were heard calling in fields opposite the VP. However, given the lack of suitable breeding habitat, the activity of the birds (commuting along the river) and the lack of records it is not thought that lapwing are dependent on this area for breeding and were likely on migration to breeding grounds. Lapwing were not recorded during Breeding Bird Walkover Surveys for lowland waders, which were only conducted along the 38 kV Uprate Works during the 2019 breeding season.
Lesser black-backed gull	Amber Listed BoCCI	Low	Lesser black-backed gull were frequently observed during VP surveys at O'Briensbridge. The majority of these flights were of birds commuting towards Parteen Basin or in the direction of the Shannon Estuary without landing in the study area. There were three records of lesser black-backed gulls during the Breeding Bird Walkover Surveys for lowland waders, as they were observed commuting along the Lower River Shannon.
Mallard	Amber Listed BoCCI	High	Mallard were frequently recorded during VP surveys at O'Briensbridge during the breeding bird seasons between 2019 and 2024. The majority of these flights were of birds commuting towards Parteen Basin or in the direction of the Shannon Estuary, with only a few records landing in the study area to feed and roost.
Meadow pipit	Red Listed BoCCI	Low	Meadow pipit was commonly encountered in wet grassland habitats. Breeding was confirmed at two separate locations in 2019. Both occurrences were noted in the surrounding fields between polesets 53B and 55B, in the fields between the Headrace and the Lower River Shannon.
Mute swan	Amber Listed BoCCI	High	Mute swans were frequently observed throughout the breeding season, but only observed in flight on six occasions, usually in pairs. Most observations were of loafing individuals. Other water bird species which were regularly observed but no flights recorded included little grebe, coot, greylag goose, moorhen and mallard.

Key Species of Conservation Significance	Breeding Conservation Status BoCCI	High/ Medium Risk Species (EirGrid 2020)	Summary of Breeding Bird Survey Results
Redshank	Red Listed BoCCI	Medium	Redshank were recorded rarely during the breeding bird seasons between 2019 and 2024 during VP surveys at O'Briensbridge, along the Lower River Shannon. This species was recorded twice in April 2019. A flock totalling 18 was recorded feeding in fields to the south-east of the VP. Given the lack of suitable breeding habitat, the activity of the birds (foraging) and the lack of records it is not thought that redshank are dependent on this area for breeding and were likely on migration to breeding grounds.
Snipe	Red Listed BoCCI	Medium	Snipe was recorded rarely during the breeding bird season between 2019 and 2024. No snipe were recorded during VP surveys at O'Briensbridge, along the Lower River Shannon. Snipe were recorded twice in May 2019 during the Breeding Bird Walkover Surveys for lowland waders. Both observations were recorded in wet grassland habitat, but no evidence of breeding activity was observed. It is unknown if this species bred in this area.

8.3.4.2.2 Other Species of Low Conservation Significance

459. Other species of low conservation significance are target species which are determined to be less at risk from potential impacts associated with the Proposed Project, as they have a more favourable conservation status, were rarely recorded during surveys, are not thought to be dependent on the area for breeding or feeding, and/or have a low potential for risk of collision with OHLs. Other species of low conservation significance recorded during breeding bird surveys for the Proposed Project are summarised in Table 8.46 and detailed results are provided in Appendix A8.21 (Breeding Bird Surveys Summary Report).

Table 8.46: Summary of Breeding Bird Survey Results for Other Species of Low Conservation Significance at the 38 kV Uprate Works Between 2019 and 2024

Other Species of Low Conservation Significance	Conservation Status	Summary of Breeding Bird Survey Results
Buzzard	Green Listed BoCCI	Buzzard were rarely recorded during VP surveys during the breeding bird seasons between 2019 and 2024. Observed behaviours included commuting, soaring and hunting.
Little grebe	Green Listed BoCCI	Little grebe were rarely observed during VP surveys at O'Briensbridge during the breeding bird seasons between 2019 and 2024. This species was not recorded flying and was mostly observed foraging on the water within the viewshed area. They were recorded in the Lower River Shannon.
Moorhen	Green Listed BoCCI	Moorhen were frequently recorded during VP surveys at O'Briensbridge during the breeding seasons between 2019 and 2024. The majority of records related to birds feeding and commuting in the area. A total of 23 moorhen were recorded throughout the survey seasons between 2019 and 2024.
Sparrowhawk	Green Listed BoCCI	Sparrowhawks were observed infrequently during the breeding bird seasons between 2019 and 2024 during VP surveys at O'Briensbridge, along the Lower River Shannon. Records only related to individuals hunting in the viewshed of the VP at O'Briensbridge.
Whimbrel	Green Listed BoCCI	Whimbrel were recorded infrequently during the breeding bird seasons between 2019 and 2024 during VP surveys at O'Briensbridge, along the Lower River Shannon. These were non-breeding as whimbrel are passage migrants during April and May as they move between Icelandic breeding areas and wintering grounds in West Africa.

Other Species of Low Conservation Significance	Conservation Status	Summary of Breeding Bird Survey Results
Goldcrest Greenfinch House martin House sparrow Linnet Spotted flycatcher Starling Swallow Willow warbler	Amber Listed (BoCCI)	A full list of all other Amber Listed species recorded during surveys can be found in Section 3.2 of Appendix A8.21 (Breeding Bird Summary Report). While some of these species are likely breeding within or near the Proposed Project, they were not recorded in detail as they do not meet the key target species criteria outlined in this assessment and Appendix 8.21. Species such as house martin, house sparrow, starling, and swallow are unlikely to be significantly affected by the Proposed Project due to their nesting ecology, which primarily involves buildings or other man-made structures. Meanwhile, species such as goldcrest, greenfinch, linnet, spotted flycatcher, and willow warbler have stable or slightly declining national populations, according to Lewis <i>et al.</i> (2019a). Any potential impacts from the Proposed Project are not expected to result in likely significant effects on these populations.
Blackbird Blackcap Blue tit Bullfinch Chaffinch Chiffchaff Coal tit Cuckoo Dipper Dunnock Goldfinch Great tit Hooded crow Jackdaw Jay Little egret Long-tailed tit Magpie Mistle thrush Pheasant Pied wagtail Raven Redpoll Reed bunting Robin Rook Sedge warbler Siskin Song thrush Stonechat Water rail Whitethroat Woodpigeon Wren	Green Listed (BoCCI)	A full list of all other Green Listed species recorded during surveys can be found in Section 3.2 of Appendix A8.21 (Breeding Bird Summary Report). While some of these species are likely breeding within or near the Proposed Project, they were not recorded in detail as they do not meet the key target species criteria outlined in this assessment and Appendix A8.21. The national and international populations of these species are stable or increasing, or they have a widespread range and diverse habitat preferences.

8.3.5 Ornithology – Wintering Birds

460. The main findings of the winter bird surveys carried out between 2015 and 2025 are summarised herein for each of the target species recorded within the study area of the Proposed Project. This includes results from the VP Surveys, I-WeBS, and hen harrier roost surveys.

461. The focus of the surveys was to establish the distribution and abundance of target species which are at potential risk from impacts associated with the Proposed Project. Species sensitivity to the Proposed Project was determined using information gathered from the desktop study, consultation with relevant stakeholders, and field surveys. Sensitivity factors include one or more of the following: risk of disturbance, displacement, and species distribution within the study area.
462. A comprehensive list of all target bird species recorded within the study area is included in Appendix A8.22 (Winter Bird Surveys Summary Report).

8.3.5.1 Wintering Birds – Desktop Review Results

463. A desktop review was undertaken for the following important bird areas within the study area of the Proposed Project: Lough Derg, Parteen Basin, Lower River Shannon and other suitable habitats for targeted wintering birds within 2km of the route of the Treated Water Pipeline.

8.3.5.1.1 Lough Derg

464. Lough Derg is situated upstream of the proposed RWI&PS. The Lough Derg (Shannon) SPA site synopsis document (NPWS 2014) states that Lough Derg is of importance for both breeding and wintering birds. In winter, the lake is important for a range of waterfowl species, especially diving ducks, with nationally important populations of tufted duck (776), goldeneye (157) and mute swan (164) (figures are average peaks for four of the five seasons 1995/1996 to 1999/2000). Other species which occur include: cormorant (90), whooper swan (18), wigeon (249), teal (301), mallard (376), black-headed gull (732), coot (173), curlew (66), lapwing (922) and little grebe (14). Lough Derg has traditionally been used by a relatively small flock of Greenland white-fronted geese based in the Lough Derg/Lough Graney area and possibly further afield. A small flock of 19 were recorded in 1996/1997 on callow land near Portumna. Few sightings of the Greenland white-fronted geese have been made at either site in recent years.
465. The key/target wintering bird species on Lough Derg are the special conservation interest species of Lough Derg (Shannon) SPA. These species include cormorant, tufted duck and goldeneye. Common tern is also a special conservation interest species for the SPA, but as it is only a breeding species it is not included in the wintering bird assessment. Secondary species considered include other wintering species which regularly reach national/international count levels within Lough Derg, such as mute swan and whooper swan. In 2025 a request was submitted to BWI for the most recent I-WeBS data available for within the study area of the Proposed Project. Data were supplied by the I-WeBS, a scheme coordinated by BWI under contract to the NPWS of the DHLGH. The results for the key/target wintering bird species on Lough Derg are as follows:
- Cormorant numbers are not known to reach international significance on Lough Derg. Results from the I-WeBS data request show cormorant occurred at nationally important levels in 2015/2016, 2017/2018, 2018/2019, 2020/2021, 2021/2022, 2022/2023, 2023/2024 and 2024/2025.
 - Tufted duck numbers do not reach international significance on Lough Derg. Results from the I-WeBS data request show tufted duck occurred at nationally important levels in 2015/2016, 2016/2017, 2017/2018, 2019/2020, 2021/2022 and 2022/2023
 - Goldeneye numbers are not known to reach international significance on Lough Derg. The population on Lough Derg appears relatively stable/slightly decreasing (BWI 2022). Results from the I-WeBS data request show goldeneye did not occur at nationally important levels in 2016/2017 up to 2024/2025.

- Mute swan is not a special conservation interest species of Lough Derg (Shannon) SPA; however, Crowe and Boland (2012) note that Lough Derg is internationally important for wintering mute swan. Results from the I-WeBS data request show mute swan occurred at nationally important numbers in 2015/2016, 2016/2017, 2017/2018, 2020/2021, 2021/2022, 2022/2023 and 2024/2025. In Ireland, mute swan are sedentary, with very little recorded movement of birds across the Irish Sea. For this reason, Ireland is considered to have its own distinct population (Wetlands International 2012). The national threshold for site importance is therefore the same as the international threshold (Lewis *et al.* 2019b).
- Whooper Swan is not a special conservation interest species of Lough Derg (Shannon) SPA. However, Burke *et al.* (2021) notes that Lough Derg is internationally important for wintering Whooper Swans, based on the results of the 2020 International Swan Census, which utilised aerial surveys. In contrast, data from the I-WeBS request indicate that Whooper Swans did not occur in nationally or internationally significant numbers in any of the requested years.

466. The results from the desktop review also showed that the Proposed Project study area around Lough Derg also supports a diverse range of other wader, wildfowl, raptor, and gull species such as curlew, lapwing, snipe, wigeon, teal, white-tailed sea eagle, and black-headed gull.
467. Additionally, an updated request was made to NPWS in 2025, which provided records on some protected wintering species, namely the Greenland white-fronted goose. The data received included a number of records for the species; however, the majority of these were historic and considered outdated. The species has experienced a significant decline in its wintering range in recent decades, as evidenced by the older records. More recent data indicated that the only confirmed occurrences of Greenland white-fronted goose were within the River Little Brosna Callows, which lies outside the Zol of the Proposed Project.

8.3.5.1.2 *Parteen Basin*

468. Parteen Basin is the proposed location for the RWI&PS. This area is not a designated conservation site for birds but is included in the Lower River Shannon SAC. It consists of a reservoir created behind the Parteen Weir in the Old River Shannon channel below Killaloe/Ballina.
469. A local NPWS Conservation Ranger highlighted that tufted duck, in particular, concentrate in this area (pers. comm., November 2014). A data request for tufted duck numbers along the Lower River Shannon (from downstream of Killaloe to upstream of O'Briensbridge in County Clare, which includes Parteen Basin) was supplied by the I-WeBS. The results showed tufted duck did occur at nationally important levels in 2015/2016 up to 2024/2025.

8.3.5.1.3 *Route of the Treated Water Pipeline*

470. Known I-WeBS sites were examined along the route of the Treated Water Pipeline which extends from the RWI&PS on the eastern shore of Parteen Basin in County Tipperary to the TPR at Peamount in County Dublin. Only two sites were located within 2km of the route and included Lough Ourna in County Tipperary and Drehid in County Kildare. The results from these sites were limited and information could only be obtained up to 2016/2017 (BWI 2022). Lough Ourna contained sizable wintering populations of waterfowl, waders and water birds, of which little grebe regularly reached nationally important numbers. Drehid contained a number of swan and waterfowl species, but concentrations were typically low and did not reach nationally important numbers.
471. There are three SPAs which are designated for hen harrier within the potential Zol (15km) of the Proposed Project: Slievefelim to Silvermines Mountains SPA, Slieve Bloom Mountains SPA, and Slieve Aughty Mountains SPA. A 15km buffer was used as an initial screening exercise; sites within and beyond this 15km buffer were subsequently reviewed for source-pathway-receptor links. The Slievefelim to Silvermines Mountains SPA is the closest to the Proposed Project, situated 1.5km south-east.

472. These three SPA sites are known to contain breeding hen harrier, but it is unknown if winter roosts are located in these areas (Ruddock *et al.*, 2024). 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 heath/bog, plantation forests that had not reached thicket stage, scrub, grassland, crops, dunes, marshes and reedbeds (O'Donoghue, 2021). The Proposed Project and wider surroundings contain potentially suitable habitat for this species. As hen harrier may travel up to 10km from a roost site for foraging (SNH 2016), the Slieve Bloom Mountains and Slievefelim to Silvermines Mountains SPA hen harrier populations are therefore within connectivity distance from potential supporting habitat within the Proposed Project.
473. In consultation with the Irish Hen Harrier Winter Survey group, data on potential and confirmed winter roost locations within the Zol of the Proposed Project were obtained. This collaboration also enhanced the winter survey effort, as the VP locations used by the survey group were shared, informing more targeted and effective roost watches.

8.3.5.1.4 Lower River Shannon

474. The 38 kV Uprate Works cross the Lower River Shannon on one occasion between polesets 66B and 67B (as shown in Appendix A8.22: Winter Bird Surveys Summary Report). The Lower River Shannon forms part of the Lower River Shannon SAC and is approximately 200m wide at the 38 kV Uprate Works crossing points. The Lower River Shannon is designated as a SAC due to the presence of Annex I habitats and Annex II aquatic species. There are no ornithological qualifying interests; however, it does serve as a commuting corridor for many bird species, and therefore there is a potential for collision risks with OHLs.
475. The Lower River Shannon and the Headrace are used as commuting corridors between the Shannon Estuary, Parteen Basin and Lough Derg (Shannon) SPA by species such as cormorant. The target wintering bird species in relation to the 38 kV Uprate Works are those listed as having a high collision risk with OHLs. These target species were selected with reference to EirGrid bird literature review (EirGrid 2016), which considers a number of factors such as bird morphology, behaviour, distribution and habitat. Target species include mute swan, cormorant, greylag goose, little grebe, mallard, moorhen and tufted duck. Bird count data for the Lower River Shannon for winter 2015/2016 up to 2024/2025 were made available upon request from BWI (BWI 2025). Data were supplied by the I-WeBS, a scheme coordinated by BWI under contract to the NPWS of the DHLGH. The results for the key/target wintering bird species on the Lower River Shannon are as follows:
- Mute swan (Amber Listed) was regularly recorded on the Lower River Shannon, as they foraged and used it as a commuting corridor. No national or internationally important numbers were noted in the I-WeBS data provided by BWI
 - The I-WeBS data showed cormorant (Amber Listed) numbers did not reach International or National significance on the Lower River Shannon. This species regularly commutes along the Lower River Shannon
 - Greylag goose (Amber Listed) did reach national numbers according to the I-WeBS data from 2016/2017, 2018/2019, 2020/2021, 2023/2024 and 2024/2025. It is also noted that some of the species encountered along the Lower River Shannon belongs to a feral population
 - Little grebe (Green Listed) I-WeBS data show that they regularly meet the threshold for national importance (20), with numbers exceeding this between 2015/2016 and 2018/2019, but failed to do so in subsequent years
 - Mallards are Green Listed; however, they are a high-risk species when it comes to collisions with OHLs. The I-WeBS data show that numbers do not reach national importance
 - According to the I-WeBS data, moorhen have not met national importance in recent years. They are Green Listed but are considered to be a high risk when it comes to collisions with OHLs

- According to the I-WeBS data, tufted duck (Amber Listed) numbers regularly reached national population levels (270 birds) in winters 2015/2016 up to 2024/2025. According to Crowe *et al.* (2016), the data from the 2015/16 surveys indicated the population is stable.

476. The Lower River Shannon also supports a diverse range of other waders which are considered to be medium-risk species in terms of impacts associated with the Proposed Project (in particular the 38 kV Uprate Works). These include curlew, lapwing, common sandpiper, and snipe.

8.3.5.2 Wintering Birds – Field Survey Results

8.3.5.2.1 Lough Derg

477. Lough Derg is designated as an SPA (Lough Derg (Shannon) SPA – 004058) and is connected hydrologically to the Proposed Project. The lake is of high ornithological importance due to the numbers of waterfowl and waders during the winter months, some of which occur at nationally important numbers. This section presents results obtained during Water Bird Count Surveys (I-WeBS) and provides an indication of the importance of the lake for wintering bird species.

8.3.5.2.1.1 Key Species of Conservation Significance

478. A summary of the results for Lough Derg for each key species of conservation significance, as identified during the desktop review, is detailed in Table 8.47. The results of the surveys indicate that Lough Derg is used by noteworthy numbers, sometimes occurring at nationally important levels, of wintering cormorant, mute swan and tufted duck. Lough Derg is also used by noteworthy numbers of coot. Detailed results of all species recorded are provided in Appendix A8.22 (Winter Bird Surveys Summary Report).

Table 8.47: Key Species of Conservation Significance, Importance of their Counts, and General Habitat and Areas Used at Lough Derg

Species	Special Conservation Interest Species of Lough Derg (Shannon) SPA	Habitat Observations/Areas
Cormorant	Yes	Cormorants were comparatively widespread throughout Lough Derg. Roost sites with larger concentrations were recorded. These roost sites were recorded along the northern and north-eastern shoreline. Cormorant occurred at nationally important numbers in a number of years, mostly at the locations that corresponded with a previously recorded nest/roost site.
Goldeneye	Yes	Goldeneye occurred in small groups often close to larger tufted duck flocks. They were widespread near the shoreline and were not observed using the more open water sections of Lough Derg. No one particular location was noted where they concentrated more frequently; however, numbers were higher overall along the northern section of the lake which is consistent with the SPA area.
Tufted duck	Yes	Tufted duck were widespread and concentrated near the shoreline in shallower waters, particularly on the edges of reed-beds. No one particular location was noted where they concentrated more frequently; however, numbers were higher overall along the northern section of the lake which is consistent with the SPA area. Tufted duck populations occurred at nationally important numbers over several of the survey years. Tufted duck are distributed throughout the smaller bays and fringing reedbed habitats of Lough Derg and around the fringe of islands. The open deeper waters, which form the vast majority of Lough Derg, are not regularly used by tufted duck.
Waders	Yes ⁸	Lapwing were relatively localised in distribution on the lake. No other wader concentrations were noted. Small numbers or sporadic records of curlew, golden plover and snipe were recorded during the survey period.

Species	Special Conservation Interest Species of Lough Derg (Shannon) SPA	Habitat Observations/Areas
Other wildfowl	Yes ⁸	A number of waterfowl including teal, mallard and other duck used the shorelines of Lough Derg in relatively low densities. No one specific location was identified where they concentrated, though waterfowl usage was generally lower south of the Castlelough headland and increased from Youghal Bay (north) which is consistent with the SPA area. Greylag geese were also recorded and reached nationally important numbers in all survey seasons, with the exception of 2018/2019. Other species such as common scoter, scaup, great northern diver and red-breasted merganser were recorded rarely.
Coot	No	Coot occurred in small groups. They were widespread near the shoreline and were not observed using the more open water sections of Lough Derg. No one particular location was noted where they concentrated more frequently; however, numbers were higher overall along the northern section of the lake which is consistent with the SPA area.
Whooper swan	No	Whooper swan used the shorelines of Lough Derg in relatively low densities. No one specific location was identified where they concentrated, though usage was generally lower south of the Castlelough headland and increased from Youghal Bay (north) which is consistent with the SPA area.
Mute swan	No	Mute swan were widespread using shallower areas close to the shoreline and islands rather than the more open sections of the lake. They concentrated near the shoreline in shallower waters in particular on the edges of reedbeds. No specific location was noted where they concentrated more frequently.

8.3.5.2.1.2 Other Species of Low Conservation Significance

479. A summary of the results for other species of low conservation significance, as identified during desktop reviews, are detailed in Table 8.48. Detailed results of all species recorded are provided in Appendix A8.22 (Winter Bird Surveys Summary Report).

Table 8.48: Other Species of Low Conservation Significance, Importance of their Counts, and General Habitat and Areas Used at Lough Derg

Species	Special Conservation Interest Species of Lough Derg (Shannon) SPA	Habitat Observations/Areas
Gulls	No ⁹	Large numbers of black-headed gull used Lough Derg and hinterland farmland throughout the winter seasons. Many of these were likely individuals that breed on Lough Derg. They were very widespread throughout Lough Derg. Smaller numbers of lesser black-backed and herring gulls also used the lake during the winter seasons.
White-tailed eagle	No. Annex I species	White-tailed eagle (recently reintroduced to Ireland) have bred near Mountshannon on the western side of Lough Derg and regularly occurs during the winter in various locations. A pair was recorded during 2017 and 2025, and individual birds were regularly recorded during the winter in the years following.

8.3.5.2.2 Parteen Basin and the Route of the Treated Water Pipeline

480. The following results for bird species recorded at Parteen Basin, along the route of the proposed Treated Water Pipeline (including the infrastructure sites) were obtained during Water Bird Count Surveys (I-WeBS), VP surveys and hen harrier roost surveys.

⁸ Other wildfowl and waders is a generic qualifying interest for the SPA which encompasses all wildfowl and waders.

⁹ Black-headed gull are listed as a special conservation interest breeding species (not wintering).

8.3.5.2.2.1 Key Species of Conservation Significance

481. A summary of the results for each key species of conservation significance, as identified during desktop reviews, recorded on Parteen Basin and along the route of the proposed Treated Water Pipeline are detailed in Table 8.49. The results of the surveys indicate that Parteen Basin is used by noteworthy numbers, sometimes occurring at nationally important levels, of wintering coot and tufted duck. The proposed route of the Treated Water Pipeline contained fewer records of key species of conservation significance and numbers of species were generally lower. Detailed results of all species recorded are provided in Appendix A8.22 (Winter Bird Surveys Summary Report).

Table 8.49: Key Species of Conservation Significance, Importance of their Counts, and General Habitat and Areas Used at Parteen Basin and Along the Route of the Treated Water Pipeline

Key Species of Conservation Significance	Winter Conservation Status (BoCCI)	Summary of Winter Bird Surveys
Black-headed gull	Amber Listed	Black-headed gull were regularly recorded on or near large water bodies such as Parteen Basin and Lough Ourna. Observations mostly related to flying or resting individuals. Numbers never exceeded national or international population thresholds.
Coot	Amber Listed	Coot were regularly recorded on or near large water bodies along the proposed Treated Water Pipeline. Observations typically related to loafing or feeding individuals. During I-WeBS surveys (particularly at Parteen Basin) numbers observed were high, even exceeding the 1% national threshold (i.e. greater than 20) during the 2015/2016 winter season, but significantly declined in the following years, when no coots were observed from 2019 to 2023.
Cormorant	Amber Listed	Cormorant were regularly recorded on or near large water bodies such as Parteen Basin and Lough Ourna. Observations mostly related to flying or resting individuals. Numbers never exceeded national or international population thresholds.
Curlew	Red Listed	Curlew were occasionally recorded along the proposed Treated Water Pipeline, often in small flocks which were observed feeding or resting typically on or near wet grasslands or bogs. Flocks never exceeded national or international population thresholds.
Gadwall	Amber Listed	Gadwall were recorded infrequently and often on or near large water bodies such as Lough Ourna. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.
Golden plover	Red Listed	Golden plover were recorded infrequently and often on or near wetlands and bogs along the proposed Treated Water Pipeline. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.
Goldeneye	Red Listed	Goldeneye were recorded infrequently and often on or near large water bodies such as Parteen Basin and Lough Ourna. Records related to feeding or resting individuals or small flocks. Numbers never exceeded national or international population thresholds.
Great crested grebe	Amber Listed	Great crested grebe were recorded infrequently and often on or near large water bodies such as Parteen Basin and Lough Ourna. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.
Greylag goose	Feral population/Amber Listed	Greylag goose were recorded frequently often on or near large water bodies such as Parteen Basin. Records related to feeding, roosting or resting individuals. Some of these birds (especially those recorded near Parteen Basin) are likely to be part of the local feral population of greylag geese which have been recorded breeding in these areas during the breeding season. Numbers never exceeded national or international population thresholds.

Key Species of Conservation Significance	Winter Conservation Status (BoCCI)	Summary of Winter Bird Surveys
Hen harrier	Amber Listed, Annex I	Hen harrier was recorded infrequently on or near large bog complexes or rough grassland in Counties Tipperary, Offaly and Kildare. Records related to commuting individuals. No definitive hen harrier roosts were identified during the survey seasons from the winter of 2016/2017 up to 2020/2021, from any of the survey locations located along the route of the Treated Water Pipeline. Male hen harriers were recorded on two occasions in 2016 potentially visiting roosting areas, near suitable roosting habitat; however repeat visits to this site in 2016 and subsequent years did not result in further observations of the species using these sites for roosting.
Herring gull	Amber Listed	Herring gull were recorded infrequently and often on or near large water bodies such as Parteen Basin or near the built-up areas surrounding the TPR. Records related entirely to flying individuals or small flocks which generally passed through the study area. Numbers never exceeded national or international population thresholds.
Lapwing	Red Listed	Lapwing were frequently recorded along the Proposed Project, often in flocks which were observed feeding or resting, typically on or near wet grasslands or bogs in Offaly and Kildare and thinly distributed elsewhere. Flocks never exceeded national or international population thresholds.
Lesser black-backed gull	Amber Listed	Lesser black-backed gull were occasionally recorded along the Proposed Project. Records relate entirely to flying individuals or small flocks which generally passed through the study area. Numbers never exceeded national or international population thresholds.
Mallard	Amber Listed	Mallard were recorded infrequently and often on or near large water bodies or wetlands along the proposed Treated Water Pipeline. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.
Mute swan	Amber Listed	Mute swan were regularly recorded on or near the large water bodies or wetlands along the proposed Treated Water Pipeline. Observations typically related to loafing or feeding individuals. Numbers never exceeded national or international population thresholds. During VP surveys at Parteen Basin, mute swan was only observed commuting between Lough Derg and Parteen Basin on 47 occasions over the survey period, with the populations appearing to be resident in each water body.
Pochard	Red Listed	Pochard were recorded infrequently and often on or near large water bodies such as Parteen Basin and Lough Ourna. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.
Redshank	Red Listed	Redshank were recorded infrequently and often on or near large water bodies such as Parteen Basin. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.
Shoveler	Red Listed	Shoveler were recorded infrequently and often on or near large water bodies such as Lough Ourna. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.
Snipe	Red Listed	Snipe were recorded infrequently and often on or near wetland areas along the proposed Treated Water Pipeline. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.
Teal	Amber Listed	Teal were recorded infrequently and often on or near large water bodies such as Parteen Basin. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.

Key Species of Conservation Significance	Winter Conservation Status (BoCCI)	Summary of Winter Bird Surveys
Tufted duck	Amber Listed	Tufted duck were regularly recorded on or near the large water bodies such as Parteen Basin. Observations typically related to loafing or feeding individuals. Tufted duck exceeded nationally important numbers (i.e. greater than 270) during seven of the nine survey seasons (only 2022/2023 and 2024/2025 did not reach nationally important numbers, however a maximum of 220 in 2022/2023 and 222 in 2024/2025 was recorded). Tufted duck often formed one large or several small flocks on Parteen Basin during the winter bird seasons. During VP surveys at Parteen Basin, a large number of flights were recorded, however the majority of these consisted of flights within Parteen Basin. Only six tufted duck were observed to be commuting between Lough Derg and Parteen Basin over the survey period, with the populations appearing to be resident in each water body.
Whooper swan	Amber Listed, Annex I	Whooper swan were recorded infrequently on or near the large water bodies such as Parteen Basin or wetlands along the proposed Treated Water Pipeline. Records related to commuting, feeding or resting individuals. Numbers never exceeded national or international population thresholds.
Wigeon	Amber Listed	Wigeon were recorded infrequently and often on or near large water bodies such as Parteen Basin and Lough Ourna. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.

8.3.5.2.2 Other Species of Low Conservation Significance

482. Other species of low conservation significance are target species which are determined to be less at risk from potential impacts associated with the Proposed Project, as they have a more favourable conservation status, were rarely recorded during surveys, or are not thought to be dependent on the area for wintering or feeding. Other species of low conservation significance recorded during winter bird surveys for the Proposed Project are summarised in Table 8.50 and detailed results are provided in Appendix A8.22 (Winter Bird Surveys Summary Report).

Table 8.50: Other Species of Low Conservation Significance, Importance of their Counts, and General Habitat and Areas Used at Parteen Basin and Along the Route of the Treated Water Pipeline

Key Species of Conservation Significance	Winter Conservation Status (BoCCI)	Summary of Winter Bird Surveys
Buzzard	Non-applicable	Buzzard were recorded frequently and in a range of habitats along the proposed Treated Water Pipeline. Records related to feeding, commuting or resting individuals.
Canada goose	Non-applicable	Canada geese were recorded infrequently near large water bodies such as Parteen Basin but was also recorded near urban areas close to the TWP. Records related to feeding or commuting individuals. Numbers never exceeded national or international population thresholds.
Glaucous gull	Green Listed	Glaucous gull were recorded on two occasions during VP surveys at the WTP site. Records related entirely to commuting individuals. Numbers never exceeded national or international population thresholds.
Great black-backed gull	Green Listed	Great black-backed gull were occasionally recorded along the proposed Treated Water Pipeline. Records related entirely to flying individuals or small flocks which generally passed through the study area. Numbers never exceeded national or international population thresholds.
Grey heron	Green Listed	Grey heron were recorded frequently and often on or near large water bodies such as Parteen Basin and Lough Ourna or in wetland areas, near bogs or wet grassland. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.

Key Species of Conservation Significance	Winter Conservation Status (BoCCI)	Summary of Winter Bird Surveys
Kestrel	Non-applicable	Kestrel were recorded frequently and in a range of habitats along the proposed Treated Water Pipeline. Records related to feeding, commuting or resting individuals.
Kingfisher	Non-applicable	Kingfisher were rarely recorded, generally on or near large water bodies such as Parteen Basin or along rivers and drains along the proposed Treated Water Pipeline. Records related to flying individuals which were recorded commuting through the study area. Numbers never exceeded national or international population thresholds.
Little egret	Green Listed	Although an Annex I species, Little egret were occasionally recorded along the proposed Treated Water Pipeline and no protected sites for the species occur within the vicinity of the Proposed Project. Records related entirely to flying individuals which generally passed through the study area. Numbers never exceeded national or international population thresholds.
Little grebe	Green Listed	Little grebe were regularly recorded on or near large water bodies or wetlands along the proposed Treated Water Pipeline. Observations typically related to loafing or feeding individuals. During I-WeBS surveys (particularly at Parteen Basin) numbers exceeded the 1% national threshold every season apart from during the 2015/2016 and 2022/2023 winter seasons. During VP surveys at Parteen Basin, little grebe were not observed commuting between Lough Derg and Parteen Basin, with the populations appearing to be resident in each water body.
Moorhen	Non-applicable	Moorhen were recorded infrequently, on or near large water bodies or wetlands along the proposed Treated Water Pipeline. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.
Sparrowhawk	Non-applicable	Sparrowhawk were recorded infrequently in a range of habitats along the proposed Treated Water Pipeline. Records related to feeding, commuting or resting individuals.
Water rail	Non-applicable	Water rail were recorded infrequently, generally on or near wetland areas along the proposed Treated Water Pipeline. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.
White-tailed eagle	Non-applicable	White-tailed eagle was recorded on one occasion in December 2016 where it was observed commuting over the Grand Canal at Ardclough in County Kildare; and once during an I-WeBS at Parteen Basin, County Clare.

8.3.5.2.3 38 kV Uprate Works

8.3.5.2.3.1 Key Species of Conservation Significance

483. A summary of the survey findings for each of the key species of conservation significance recorded during winter bird surveys for the Proposed Project, as well as the habitats and areas used, are provided in Table 8.51.

Table 8.51: Summary of Key Species of Conservation Significance Observed, Significance of Counts, and General Habitat and Areas Used Within the Study Area

Species	Winter Conservation Status (BoCCI)	High/Medium Risk Species (EirGrid 2020)	General Habitat and Areas Used
Cormorant	Amber Listed	High	Cormorants were regularly recorded as they commuted along the Lower River Shannon, Headrace and across Parteen Basin. They were also recorded on a few occasions as they foraged in these areas. They were not recorded at nationally important numbers; however, they are considered a high risk for collision with OHLs.
Common sandpiper	-	Medium	Common sandpiper was observed infrequently as it foraged along the shoreline of the Headrace. It was also once recorded foraging along the Lower River Shannon. This species is considered to be at medium risk to collision with OHLs; however, it was not observed flying at collision height.

Species	Winter Conservation Status (BoCCI)	High/Medium Risk Species (EirGrid 2020)	General Habitat and Areas Used
Curlew	Red Listed	Medium	Curlew is considered to be at medium risk of collision with OHLs. This species was observed infrequently at Parteen Basin as it foraged along the shoreline. It was not recorded flying near the existing OHLs during surveys.
Green sandpiper	Green Listed	Medium	Green sandpiper was recorded infrequently as they foraged along the edge of the Headrace and twice at Parteen Basin. This species was recorded flying infrequently and always below the existing OHLs.
Great crested grebe	Amber Listed	High	Great crested grebe was encountered infrequently as they foraged on Parteen Basin. Although this species is considered to be at high risk of collision with OHLs, it was not recorded flying in the Zol of the lines. This species spends most of its time on open unvegetated waters.
Greylag goose	Amber Listed	High	Greylag goose is a species at high risk of collision with OHLs. It was recorded frequently throughout the study area with commuting flights along the Lower River Shannon, Headrace and to Parteen Basin. The species was often recorded roosting on a spit of land on Parteen Basin on arrival during dawn surveys between 2019 to 2023.
Goldeneye	Red Listed	High	Goldeneye occur in small groups often close to larger tufted duck flocks. They are usually found near the shoreline of Parteen Basin. This species was not recorded at nationally important numbers and was not observed flying in the proximity of the existing OHLs.
Goosander	-	High	Goosander is at high risk of collision with OHLs. The species was recorded once in Parteen Basin where it was observed flying from the Headrace. Three individuals were observed landing in the water in Parteen Basin where they began foraging.
Lapwing	Red Listed	Medium	Lapwing is a species at medium risk of collision with OHLs. It was recorded frequently throughout the study area, with commuting flights along the Lower River Shannon, Headrace and Parteen Basin. The species was often recorded resting along the shoreline of Parteen Basin or the banks of the Headrace, typically in flocks which ranged from one to 85 birds.
Little grebe	Green Listed	High	Little grebe was encountered infrequently as they foraged on Parteen Basin, the Headrace and the Lower River Shannon. Although this species is considered at high risk of collision with OHLs, it was not recorded flying at collision height or in the Zol of the existing lines. This species spends most of its time near the shoreline, particularly among reedbeds.
Mallard	Amber Listed	High	Mallard is a species at high risk of collision with OHLs. It was recorded frequently throughout the study area with commuting flights along the Lower River Shannon, Headrace, open countryside and Parteen Basin. This species regularly commuted in the Zol of the existing OHLs.
Moorhen	Green Listed	High	Moorhen was encountered infrequently as they foraged on Parteen Basin and the Lower River Shannon. Although this species is considered at high risk of collision with OHLs, it was not recorded flying in the Zol of the existing lines. This species spends most of its time near the shoreline, particularly among reedbeds.
Mute swan	Amber Listed	High	Mute swan were widespread and used shallower areas close to the shoreline and islands rather than the more open sections of water. They concentrated near the shoreline in shallower waters on the edges of reedbeds. They were recorded frequently throughout the study area with commuting flights along the Lower River Shannon, Headrace and Parteen Basin.
Pochard	Red Listed	High	Pochard can be found during the winter as they forage on lakes, reservoirs, and estuaries. They are a high-risk species for collision with OHLs. Pochard was recorded on five occasions at Parteen Basin. This species was only recorded foraging and was not witnessed flying in the Zol of the OHLs.
Redshank	Red Listed	Medium	Redshank was frequently recorded as it foraged along the edge of the Headrace. It was not observed flying in the Zol of the existing OHLs.
Snipe	Red Listed	Medium	Snipe were recorded very infrequently throughout the study area, having been recorded twice, foraging along the banks of the Headrace. This species was not recorded flying within the Zol of the existing OHLs. They are of medium collision risk with OHLs.

Species	Winter Conservation Status (BoCCI)	High/Medium Risk Species (EirGrid 2020)	General Habitat and Areas Used
Scaup	Red Listed	High	Scaup are a species at high risk of collision with OHLs. It was only recorded once on Parteen Basin among a raft of tufted ducks and was not recorded flying within the ZoI of the existing OHLs.
Teal	Amber Listed	High	Teal are a species at high risk of collision with OHLs. They were recorded infrequently within the study area as they foraged on two occasions on the Headrace and twice at Parteen Basin. Teal were recorded roosting once at Parteen Basin. They were not recorded flying within the ZoI of the existing OHLs. Teal usually forage near the shoreline in shallower waters.
Tufted duck	Amber Listed	High	Tufted duck were present on Parteen Basin and concentrate near the shoreline in shallower waters on the edges of reed-beds. Tufted duck populations exceeded the 1% national threshold (270) at Parteen Basin in January, November, and December 2020, January 2021 and November 2024 when they reached 400, 900, 365, 310 and 450 individuals respectively. They were infrequently recorded flying and not observed near any existing OHLs.
Wigeon	Amber Listed	High	Wigeon are a species at high risk of collision with OHLs. It was only recorded once in November 2020, November 2024 and January 2025 on Parteen Basin, with birds foraging, swimming and loafing along the shoreline. The pair was not recorded flying within the ZoI of the existing OHLs.
Whooper swan	Amber Listed	High	Whooper swan were recorded on Parteen Basin and the open countryside infrequently and in low numbers. They are considered a high-risk species in terms of collision with OHLs; they were observed flying at Parteen Basin in low numbers with a maximum of two birds and were recorded flying above the existing OHLs from a VP overlooking the open countryside.

8.3.5.2.3.2 Other Species of Low Conservation Significance

484. During field surveys, several species which are considered at low risk of collision with OHLs were also recorded. These species are not considered target species for the 38 kV Uprate Works; however, this section presents a brief overview of waders, gulls and raptors which were observed in the study area.

Gull species

485. Black-headed gull is an Amber Listed species (breeding and wintering), regularly observed commuting through the study area. This species generally followed aquatic features and was recorded commuting over the Lower River Shannon, Headrace and Parteen Basin.

486. Great black-backed gull is a Green Listed species and was only recorded once, when two birds were recorded flying over Parteen Basin.

487. Herring gull is an Amber Listed species and was recorded on two occasions during the VP surveys as they foraged and commuted along the Lower River Shannon.

488. Lesser black-backed gull is an Amber Listed species and was recorded on sixteen occasions during the VP surveys. This species was recorded throughout the study area.

Raptors

489. Marsh harrier is an Amber Listed species (breeding only). It was recorded on one occasion along the Lower River Shannon, likely on passage.

490. Sparrowhawk is a Green Listed species. It was recorded hunting on four occasions throughout the study area.

Water birds

- 491. Canada Goose is a non-native/introduced species. A pair were recorded on one occasion at Parteen Basin in March 2021. The species was only recorded foraging on the water during the survey.
- 492. Grey heron is a Green Listed species, regularly recorded foraging and commuting throughout the study area.
- 493. Little egret is listed on Annex I of the Birds Directive and is classed as a Green Listed species. This species was recorded on two occasions as it foraged and commuted at Parteen Basin.

Kingfisher

- 494. Kingfisher is listed on Annex I of the Birds Directive and is classed as an Amber Listed species (breeding only). It was recorded on several occasions as it foraged along the Headrace, Lower River Shannon, and Parteen Basin.

8.3.6 Ecological Valuation and Identification of Key Ecological Receptors

- 495. Following a review of the existing environment, presented in Section 8.3, it is possible to determine the KERs that occur within the ZOI which require consideration regarding potential impacts and mitigation. These include specific receptors that have been identified as being of local importance (higher value) or greater.
- 496. The identified KERs which may potentially be impacted by works associated with the Proposed Project are evaluated in this EIAR. The significance of each species and habitat associated with the Proposed Project is presented in Table 8.52 along with the rationale for its selection/exclusion as a KER.
- 497. European sites are listed in Table 8.52 and were also assessed separately under the requirements of the Habitats Directive in the NIS for the Proposed Project in accordance with the requirements of Part XAB of the Planning and Development Act 2010 (as amended) and the Birds Directive and Habitats Directive.
- 498. Table 8.52 identifies potential GWDTEs using habitat survey information and further assesses the likelihood of groundwater dependency based on ecological, geological, hydrogeological and topographical context. Once GWDTEs were identified, potential impacts which could occur as a result of the construction or operation of the Proposed Project were assessed.

Table 8.52: Evaluation of Key Ecological Receptors and Locations Within the Study Area of the Proposed Project

Site/Feature	Evaluation	Brief Description of Ecological Receptor	Relevant Location	Key Ecological Receptor(s)?
Designated Conservation Areas				
Lower River Shannon SAC	International	Riparian habitat, aquatic fauna including lamprey sp., Atlantic salmon and otter	O'Briensbridge, County Clare, Parteen Basin, County Tipperary	Yes
Lisduff Fen SAC	International	Petrifying spring, alkaline fen, Geyer's whorl snail	South-east of Birr, County Offaly	Yes
Sharavogue Bog SAC	International	Raised bog	South of Birr, County Offaly	Yes
River Barrow and River Nore SAC	International	Alluvial woodland, floating river vegetation, petrifying springs, Desmoulin's whorl snail, freshwater pearl mussel, white-clawed crayfish, lamprey sp., Atlantic salmon, otter	Upstream reaches near the Slieve Bloom Mountains, County Offaly	Yes
Lough Derg, North-East Shore SAC	International	Juniper scrub, <i>cladium</i> fens, alkaline fens, limestone pavement, alluvial forests, yew woodlands	Northen shore of Lough Derg, County Tipperary	Yes
Rye Water Valley/Carton SAC	International	Petrifying springs, narrow-mouthed whorl snail, Desmoulin's whorl snail	Between Leixlip and Maynooth, in Counties Meath and Kildare, and extends along the Rye Water, a tributary of the River Liffey	Yes
Charleville Wood SAC	International	Alluvial woodland, Desmoulin's whorl snail	South-west of Tullamore in County Offaly	Yes
River Boyne and River Blackwater SAC	International	Alkaline fens, alluvial forests, river lamprey, Atlantic salmon, otter	Riverine stretches draining a considerable area of Counties Meath and Westmeath, and smaller areas of Cavan and Louth	Yes
River Shannon Callows SAC	International	<i>Molinia</i> meadows, lowland hay meadows, alkaline fens, limestone pavement, alluvial forests, otter	Between the towns of Athlone, County Westmeath and Portumna, County Galway	Yes
Slievefelim to Silvermines Mountains SPA	International	Hen harrier	Extensive upland site located in Counties Tipperary and Limerick	Yes
Slieve Bloom Mountains SPA	International	Hen harrier	On the border between Counties Offaly and Laois	Yes
Lough Derg (Shannon) SPA	International	Cormorant, tufted duck, goldeneye, common tern, wetland and waterbirds	Lough Derg lies within Counties Tipperary, Galway and Clare	Yes
Dovegrove Callows SPA	International	Greenland white-fronted goose	Area of callowland beside the Little Brosna River 2km downstream from Birr, County Offaly	Yes
River Little Brosna Callows SPA	International	Whooper swan, wigeon, teal, pintail, shoveler, golden plover, lapwing, black-tailed godwit, black-headed gull, Greenland white-fronted goose, wetland and waterbirds	Follows the River Brosna from its confluence with the River Shannon	Yes
River Shannon and River Fergus Estuaries SPA	International	Black-headed gull, grey plover, whooper swan, golden plover, shelduck, bar-tailed godwit, light-bellied brent goose, ringed plover, black-tailed godwit, curlew, greenshank, wigeon, redshank, lapwing, cormorant, shoveler, teal, knot, scaup, pintail, dunlin, wetlands	The entire estuarine habitat from Limerick City westwards as far as Doonaha in County Clare and Dooneen Point in County Kerry	Yes
Slieve Aughty Mountains SPA	International	Hen harrier and merlin	Extends southwards from just south of Lough Rea, County Galway to Scariff in County Clare	Yes
River Boyne and River Blackwater SPA	International	Kingfisher	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	Yes
Poulaphouca Reservoir SPA	International	Greylag goose, lesser black-backed gull	Western foothills of the Wicklow Mountains	Yes
Middle Shannon Callows SPA	International	Whooper swan, wigeon, corncrake, golden plover, lapwing, black-tailed godwit and black-headed gull, wetland and waterbirds	Extends for approximately 50km from the town of Athlone to the town of Portumna	Yes
Screggan Bog NHA	National	Raised bog	Located 7km south-west of Tullamore, mainly in the townlands of Ross and Killurin in County Offaly	Yes
Annaghmore Lough Fen pNHA	National	Fen	Situated about 10km south of Tullamore, on the border of Laois and Offaly below the Slieve Bloom Mountains	Yes
Willsborough Esker pNHA	National	Esker	Located 9km north of Nenagh in County Tipperary	Yes
Cloonlara House pNHA	National	Leisler's bat	House in Cloonlara, County Clare	Yes
Birr (Domestic Dwelling No. 1, Occupied) pNHA	National	Leisler's bat	House in Birr, County Offaly	Yes
Birr (Domestic Dwelling No. 2, Occupied) pNHA	National	Leisler's bat	House in Birr, County Offaly	Yes
Kinnitty (Domestic Dwelling, Occupied) pNHA	National	Leisler's bat	House in Kinnitty, County Offaly	Yes
Bracken's Dwelling, Near Whiteford pNHA	National	Leisler's bat	House near Whiteford, County Offaly	Yes
Clonad Wood pNHA	National	Deciduous woodland	Bordering the Clodiagh River, 5km south of Tullamore in County Offaly	Yes
Mount St. Joseph Woods pNHA	National	Four esker woodland blocks on two low esker ridges that flank the Little Brosna River	Approximately 4km west of Roscrea in County Offaly	Yes

Site/Feature	Evaluation	Brief Description of Ecological Receptor	Relevant Location	Key Ecological Receptor(s)?
Miltown, Shinrone pNHA	National	Natterer's bat	Old stone farm building at Miltown Park, Shinrone, County Offaly	Yes
Grand Canal pNHA	National	Riparian habitat, opposite-leaved pondweed, otter	Kilpatrick, County Kildare, Colganstown, County Dublin	Yes
Annex I Habitats				
<i>Molinia</i> Meadows (Annex I Habitat [6410])	National	<i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils. The site at Cloughjordan consists of an area of wet grassland and scrub vegetation, divided by a central treeline running in an almost east-west direction, with an associated drainage ditch. The site has recently undergone land 'improvement' which included clearance of scrub vegetation and maintenance or excavation of drainage ditches (Appendix A8.4: Target Habitat Surveys Report). This area is considered of county importance as it contains an area of Annex I habitat that does not fulfil the criteria for national importance. It also contains semi-natural habitat types of high biodiversity value in county context (Appendix A8.4: Target Habitat Surveys Report). The <i>Molinia</i> meadows habitat is located 90m from the Treated Water Pipeline from the WTP to the BPT. The Treated Water Pipeline from the WTP to the BPT in this area is underlain by topsoil and stiff greyish brown CLAY with cobbles to >3.9m, not peat, based on site walkover within the Proposed Project. The underlying bedrock is a Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zone.	Cloughjordan, County Tipperary (ITM coordinates: E 593976, N 689346) – approximately 90m outside the Proposed Project and separated from the Proposed Project by a drainage ditch. No surface water connection or groundwater dependent ecosystems would be impacted by the Proposed Project.	No – sites are located outside of the Zol
Alkaline Fen (Annex I Habitat [7230])	National	Derrinclare Fen – this fen habitat was subject to peat cutting in the past. The fen vegetation has established in areas under the influence of mineral-rich groundwater, probably as a result of past cutting extending into the mineral substrate beneath the former bog. The fen communities include areas of great fen-sedge (<i>Cladium mariscus</i>) and black bog-rush (<i>Schoenus nigricans</i>). The fen areas are rich in brown mosses including yellow starry feather moss (<i>Campylium stellatum</i>), hooked scorpion-moss (<i>Scorpidium scorpioides</i>), and liverwort (<i>Aneura pinguis</i>). The fen habitat occurs in an intimate mosaic together with scrub and regenerating bog communities (Appendix A8.4: Target Habitat Surveys Report). This area also contained the Annex II species marsh fritillary. This fen area is located 220m from the Proposed Project and is beyond the Zol (Section 8.2.2). The Treated Water Pipeline from the BPT to the TPR in this area is underlain by topsoil and stiff brown CLAY/SILT with cobbles to >4m. Groundwater levels are >3.5mbgl. Peat up to 1m deep occurs in the low-lying area with peaty soils along the margins of the fen, reclaimed for agriculture and forestry. Organic soils and alluvial sediments underlie the fen area. The fen habitat occurs in the lower lying parts of the site that were subject to peat cutting in the past. Deep drainage channels every 20m ran north south perpendicular with the Black River, which have slowly infilled since cutting stopped. The underlying bedrock is a Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zone. Local groundwater discharge to the fen area occurs with a spring line occurring along the southern margin of current fen area. Lagg area is modified.	Derrinclare, County Offaly (ITM coordinates: E 601363, N 691909) – approximately 220m outside the Proposed Project. No surface water connection or groundwater dependent ecosystems would be impacted by the Proposed Project.	
	National	Coagh Fen – alkaline fen (<i>Schoenus</i> fen) area dominated by black bog-rush (<i>Schoenus nigricans</i>). The fen area is located on a break in slope at the base of a steep hill. The fen area appears be a remnant of a larger wetland habitat, which has survived in a local topographical depression. The fen vegetation is located in a slight depression of approximately 25cm, possibly in a former drainage channel/drainage ditch. The area was approximately 100 x 30m in extent with scattered gorse (<i>Ulex europaeus</i>) scrub patches between the fen and the adjacent grazed improved agricultural grassland (Appendix A8.3: Site Description of Coagh Upper Fen, County Offaly and Appendix A8.4: Target Habitat Surveys Report). Water levels in the fen are likely to be maintained by overland surface water runoff and groundwater. No inflow stream to the wetland was detected indicating that it is likely spring fen. The fen is underlain by 0.3 to 0.4m organic soils overlying silty SAND. The organic soils are deeper towards the Coagh Stream, which forms a hydrological boundary. During the time of survey, ground soils were dry with no evidence of spring inflows and there was no peat based on the site walkover. The underlying bedrock is a Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zone.	Coagh Upper, County Offaly (ITM coordinates: E 615481, N 707589) – approximately 100m outside the Proposed Project. No surface water connection or groundwater dependent ecosystems would be impacted by the Proposed Project.	
	Local importance (lower value)	Raheenduff Fen – in 2020 this area comprised <i>Schoenus</i> dominated rich fen (PF1) adjoined by wet grassland (GS4), with scrub (WS1) encroaching from the field boundaries. A tufa spring occurred in the east of the site. Although the fen area was small in extent, it was of high local importance as it corresponded to Alkaline Fen, a habitat listed on Annex I of the EU Habitats Directive. Past drainage had impacted the hydrological integrity of the fen and was likely to have caused a loss of fen habitat (Appendix A8.4: Target Habitat Surveys Report). The site was subject to a third habitat survey in July 2024 where it was found to be impacted by significant drainage modifications and construction works (not associated with the Proposed Project) and is therefore considered to no longer contain any Annex I habitats. Raheenduff fen is located 90 to 120m from the Treated Water Pipeline from the BPT to the TPR to the west of the Finter Stream. The Treated Water Pipeline from the BPT to the TPR in this area is underlain by topsoil and stiff brown SILT/CLAY with cobbles to >3m. No peat was encountered in the pipeline area based on a site walkover. The underlying bedrock is a Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zone. The Finter Stream is located between the Treated Water Pipeline from the BPT to the TPR and the wetland/fen area and forms a hydrological boundary. The stream is 1.5 to 2m deep.	Raheenduff, County Offaly (ITM coordinates: E 640583, N 720087) – approximately 100m outside the Proposed Project. No surface water connection or groundwater dependent ecosystems would be impacted by the Proposed Project.	
Alkaline Fen (Annex I Habitat [7230]) /Scrub	National	Alkaline fen/scrub comprised of alkaline fen (PF1) adjoined by wet grassland (GS4), with scrub (WS1) encroaching along the southern and eastern boundaries. The Proposed Project in this area comprised improved grassland. Big Wood Fen occurs in a topographical depression at the base of Big Wood Hill. While the area is slightly modified by drainage, the lack of gradient ensures the area remains wet/damp throughout the year. A number of soil exposures in the drainage ditches along the Proposed Project were noted on the boundaries of site comprising firm, light brown slightly sandy very gravelly SILT. The fen area is mapped as an area of cutover peat. The underlying bedrock is a Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zone. Recharge to the fen occurs via rainfall and groundwater from Big Wood to the east of the fen. The fen is located upgradient of the Proposed Project and is separated by a deep drain running north-east/south-west as well and two deep drainage ditches along the local road.	Big Wood, County Offaly (ITM coordinates: E 609205, N 700232) – fen area approximately 150m to 250m outside the Proposed Project. No surface water connection or groundwater dependent ecosystems would be impacted by the Proposed Project. Site is located upgradient of the Proposed Project.	

Site/Feature	Evaluation	Brief Description of Ecological Receptor	Relevant Location	Key Ecological Receptor(s)?
Transition Mire (Annex I Habitat [7140])	National	Transition mire comprising low-lying wetland area. The surface was extremely wet and quaking comprising a floating mat. The habitat represents a good example of transition mire with typical species assemblage, a high stable water table and no impacting activities recorded (Appendix A8.4: Target Habitat Surveys Report). Coolfin Transition Mire is shallow mire (0.4 to 0.6m deep) and occurs in a topographical depression. While the area is slightly modified by drainage, the lack of gradient ensures the mire remains wet/damp throughout the year. Groundwater levels in the wetland/mire area are between 0.2 and 0.28mbgl. A number of soil exposures were noted on the boundaries of site comprising firm to stiff, light brown slightly sandy gravelly SILT. Recharge to the mire occurs via rainfall and land drainage to the south. The mire does not appear to be recharged by groundwater based on water quality measurements.	Coolfin Glebe, County Offaly (ITM coordinates: E 619869, N 711108) – approximately 90m outside the Proposed Project. No surface water connection or groundwater dependent ecosystems would be impacted by the Proposed Project.	
Turloughs (Annex I Priority Habitat [3180])	International	Ardcrony Turlough – identified in 2016 (Appendix A8.4: Target Habitat Surveys Report), located immediately west of the village of Ardcroney, County Tipperary. Three distinct vegetation zones were observed within the basin. Around the outer margin of the basin is a wet grassland community dominated by various grasses and abundant silverweed (<i>Potentilla anserina</i>). Next vegetation zone was characterised by common spike-rush (<i>Eleocharis palustris</i>), water smartweed (<i>Polygonum amphibium</i>), and amphibious bistort (<i>Potentilla anserina</i>). In the lowest part of the turlough basin the vegetation was characterised by a low-growing sward of water smartweed and a high cover of three-leaved water-crowfoot (<i>Ranunculus trichophyllus</i>) with areas of bare mud often associated with cattle poaching. The Preferred 200m Pipeline Corridor at the time (Appendix A8.4: Target Habitat Surveys Report) was subsequently re-routed to directly avoid this habitat. This wetland/turlough is located in a topographical depression at the base of a gravel hill with groundwater and surface water inflows. While the area is slightly modified by drainage to the west of the site, the lack of gradient ensures the wetland/turlough remains wet/damp throughout the year. The site is underlain by lacustrine deposits and tills. A number of soil exposures were noted on the boundaries of site to comprise firm to stiff, light brown/grey slightly sandy gravelly SILT with gravels evident to the east of the turlough. Recharge to the turlough occurs via rainfall and some groundwater inflows and periodic flooding from the Ardcroney Stream.	Immediately west of the village of Ardcroney, County Tipperary (ITM coordinates: E 588962, N 687221) – 445m south of the Proposed Project. Ardcroney turlough is located upgradient of the Proposed Project and therefore outside of the Zol.	No – sites are located outside of the Zol
		Ballythomas Turlough – identified in 2017 (Appendix A8.4: Target Habitat Surveys Report), located in County Tipperary. Three main vegetation zones were observed within the basin. The upper margin of the basin is dominated by semi-improved dry calcareous neutral grassland that is subject to grazing by cattle. The key grassland species present include: ribwort plantain (<i>Plantago lanceolata</i>), perennial rye-grass (<i>Lolium perenne</i>), cat's ear (<i>Hypochaeris radicata</i>), common sorrel (<i>Rumex acetosa</i>), common mouse-ear (<i>Cerastium fontanum</i>), white clover (<i>Trifolium repens</i>), hairy sedge (<i>Carex hirta</i>), meadow buttercup (<i>Ranunculus acris</i>), creeping buttercup (<i>R. repens</i>), red clover (<i>Trifolium pratense</i>), Yorkshire fog (<i>Holcus lanatus</i>), sweet vernal grass (<i>Anthoxanthum odoratum</i>), yarrow (<i>Achillea millefolium</i>), crested dogs-tail (<i>Cynosurus cristatus</i>), dandelion (<i>Taraxacum officinale</i>), and creeping bent (<i>Agrostis stolonifera</i>). The next vegetation zone was characterised by a similar community to that described above with the occurrence of increasing amounts of silverweed and a lack of some of the drier grassland species. In the lowest part of the turlough basin the vegetation was characterised by a dense sward of water smartweed and a high cover of silverweed with some small areas of bare mud often showing signs of cattle poaching. A previous iteration of the project was subsequently re-routed to directly avoid this habitat. This habitat is of national importance as it comprises a 'viable' area of priority Annex I habitat (Appendix A8.4: Target Habitat Surveys Report). This wetland/turlough is located in a topographical depression at the base of a hill with groundwater and surface water inflows. The area is slightly modified by drainage to the north of the site. The area is subject to flooding; however, it does not appear to flood every year. Summer groundwater levels are between 7 and 8mbgl. No lacustrine deposits were encountered on the site. There is no evidence of karst features in the flooded area. Soil exposures were noted on the boundaries of site comprising firm grey sandy CLAY with cobbles and dense GRAVEL (BH232). Flooding occurs through a combination of rainfall, overland flow, the Ardcroney Stream and high groundwater levels during the winter period.	Ballythomas, Ardcroney, County Tipperary (ITM coordinates: E 587591 N 687683) – potential extent is adjacent to the Proposed Project.	Yes – adjacent to the Proposed Project. Potential for surface water runoff into area. Groundwater levels in summer are below the proposed pipeline level. Potential for groundwater impacts are addressed in Chapter 10 (Soils, Geology and Hydrogeology) and Section 8.5.2.1.
Cladium Fen (Annex I Priority Habitat [7210])	International	This fen habitat was subject to peat cutting in the past. The fen vegetation has established in areas under the influence of mineral-rich groundwater, probably as a result of past cutting extending into the mineral substrate beneath the former bog. The fen communities include areas of great fen-sedge (<i>Cladium mariscus</i>) fen and black bog-rush (<i>Schoenus nigricans</i>) fen. The fen areas were rich in brown mosses including yellow starry feather-moss (<i>Campyllum stellatum</i>), hooked scorpion-moss (<i>Scorpidium scorpioides</i>), and greasewort (<i>Aneura pinguis</i>). The fen habitat occurred in an intimate mosaic together with scrub and regenerating bog communities (Appendix A8.4: Target Habitat Surveys Report). This fen area is located 260m from the Proposed Project. The Treated Water Pipeline from the BPT to the TPR in this area is underlain by topsoil and stiff brown CLAY/SILT with cobbles to >4m. Groundwater levels are >3.5mbgl. Peat up to 1m deep occurs in the low-lying area with peaty soils along the margins of the fen reclaimed for agriculture and forestry. Organic soils and alluvial sediments underlie the fen area. The fen habitat occurs in the lower lying parts of the site that were subject to peat cutting in the past. Deep drainage channels every 20m that ran north south perpendicular with the Black River, have slowly infilled since cutting stopped. The underlying bedrock is a Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zone. Local groundwater discharge to the fen area occurs with a spring line occurring along the southern margin of current fen area.	Derrinclare, County Offaly (ITM coordinates: E 601363, N 691909) – approximately 260m outside the Proposed Project. No surface water connection or groundwater dependent ecosystems would be impacted by the Proposed Project.	No – site located outside of the Zol.

Site/Feature	Evaluation	Brief Description of Ecological Receptor	Relevant Location	Key Ecological Receptor(s)?
Active Raised Bog (Annex I Priority Habitat [7110])	International	Island bog, located south of Daingean, County Offaly, consists of two raised bog (PB1) remnants on either side of the local public road running north to south through the area. The more extensive western area of high bog has been severely impacted by drainage and does not support any active raised bog habitat. A Difco-cut area in the centre of a high bog remnant shows evidence of secondary bog regeneration, possibly the result of surface subsidence. <i>Sphagnum</i> cover in this area is approximately 80%, composed primarily of papillose bog-moss (<i>Sphagnum papillosum</i>), red bog-moss (<i>S. capillifolium</i>), and magellanic bog-moss (<i>S. magellanicum</i>) and occasional feathery bog-moss (<i>S. cuspidatum</i>). Ten Difco-cut channels approximately 1.5m apart run in an east-west direction through approximately 100m of the bog remnant. A low hummock and lawn structure occur. There are no pools present. Hare's-tail cottongrass (<i>Eriophorum vaginatum</i>) is frequent with scattered white beak-sedge (<i>Rhynchospora alba</i>) in depressions. This community equates to sub-central ecotype (active raised bog) with an affinity to community complex¹⁰ 10/9/3 (10 = <i>Sphagnum</i>, 9 = <i>Eriophorum vaginatum</i>, 3 = <i>Carex panacea</i>) but without the occurrence of carnation sedge (<i>Carex panacea</i>). This habitat is evaluated as national importance due the presence of active raised bog within the eastern section of Island Bog (Appendix A8.4: Target Habitat Surveys Report). This peatland is located to the north of a cutover bog and is delineated by a local access road and access track. The peatland in this area is underlain by deep glacial till deposits. Drainage channels occur along the boundary of the peatland. Groundwater levels along the boundary were between 0.4 and 0.8mbgl in 2021. No areas of active raised bog occur within the Proposed Project.	Island, County Offaly (ITM coordinates: E 648073, N 724624) – approximately 280m outside the Proposed Project.	No – site located outside of the Zol.
	International	An area of intact high bog occurs east of Derrinturn and north of the Drehid Waste Facility in County Kildare. The high bog area includes significant areas of active raised bog, comprising mainly sub-central ecotype, community complex¹⁰ 10/4 (10 = <i>Sphagnum</i>, 4 = <i>Rhynchospora alba</i>). There are also a number of large depressions or possibly infilling pools within the sub-central area which correspond with central ecotype, community complex 14, the wettest type of active raised bog. These features are likely to be the result of subsidence and secondary re-wetting (Appendix A8.4: Target Habitat Surveys Report). The peatland in this area is located to the north of a cutover bog and delineated by a local access road and access track. The peatland is underlain by deep glacial till deposits. Drainage channels occur along the boundary of the peatland. Groundwater levels along the boundary were between 0.37 and 0.47mbgl in 2021. No areas of active raised bog occur within the Proposed Project at this location.	Timahoe West, County Kildare (ITM coordinates: E 675205, N 733301) – approximately 62m outside the Proposed Project.	
Petrifying Springs with <i>Tufa</i> Formation (Annex I Priority Habitat [7220])	Local importance (lower value)	In 2020, a <i>Tufa</i> forming spring occurred within the eastern section of an alkaline fen at this location. The spring was surrounded by species comprising a <i>Schoenus</i> fen community. Although the fen area was small in extent, it was of high local importance as it corresponded to alkaline fen, a habitat listed on Annex I of the EU Habitats Directive. Past drainage had impacted the hydrological integrity of the fen and was likely to have caused a loss of fen habitat (Appendix A8.4: Target Habitat Surveys). The site was subject to a third walkover survey in July 2024 where it was found to be impacted by significant drainage modifications and construction works (not associated with the Proposed Project) and is therefore no longer considered to contain any Annex I habitats.	Raheenduff, County Offaly (ITM coordinates: E 640642, N 719865) – Approximately 80m outside the Proposed Project.	No
Habitats				
Arable crops (BC1)	Local importance (lower value)	Agricultural land that is cultivated and managed for the production of arable crops. Accounted for 146ha (11.87%) of habitats within the Proposed Project.	This habitat was common throughout the Proposed Project.	No
Tilled land (BC3)	Local importance (lower value)	Bare land that has been tilled or prepared for planting. Accounted for 12.43ha (1.01%) of habitats within the Proposed Project.	This habitat was common throughout the Proposed Project, with the majority occurring in Counties Offaly and Kildare.	No
Stone walls and other stonework (BL1)	Local importance (lower value)	Most built stone structures. Typically overgrown with ivy and bramble and no protected species recorded. Accounted for 0.03ha / 282.66m (0.002% / 0.16%) of habitats within the Proposed Project.	This habitat was encountered infrequently throughout the Proposed Project.	No
Earth banks (BL2)	Local importance (lower value)	Vegetated and non-vegetated earth banks that delineate field boundaries. Accounted for 0.04ha / 109.77m (0.003% / 0.06%) of habitats within the Proposed Project.	This habitat was encountered infrequently throughout the Proposed Project.	No
Buildings and artificial surfaces (BL3)	Local importance (lower value)	All existing built access tracks (gravel/hardcore), as well as public roads and private and commercial dwellings or buildings. Accounted for 33.05ha / 667.43m (2.69% / 0.38%) of habitats within the Proposed Project.	Recorded throughout the Proposed Project, most commonly where landowners have built access tracks through their land.	No
Buildings and amenity grassland mosaic (BL3/GA2)	Local importance (lower value)	Includes buildings, artificial surfaces with amenity grassland. Accounted for 0.70ha (0.06%) of habitats within the Proposed Project.	Recorded infrequently throughout the Proposed Project. Commonly found in areas of domestic buildings and lawns (amenity grassland).	No
Exposed sand, gravel or till (ED1)	Local importance (lower value)	Includes natural or artificial exposures of unconsolidated coarse or mixed sediment. Accounted for 73.95m (0.04%) of habitats within the Proposed Project.	This habitat was recorded on one occasion within the Proposed Project within the townland of Rathfeston, County Offaly near Chainage TWC – 12000.	No
Spoil and bare ground (ED2)	Local importance (lower value)	Heaps of spoil/rubble/gravel stockpiled by individuals or temporary hardstand areas. Accounted for 0.5ha (0.04%) of habitats within the Proposed Project.	Several locations all within County Tipperary.	No
Recolonising bare ground (ED3)	Local importance (lower value)	Areas of bare, or disturbed ground that is being re-colonised by herbaceous plants. Accounted for 0.78ha / 204.10m (0.06% / 0.12%) of habitats within the Proposed Project.	This habitat was encountered in discrete areas of waste or disturbed ground infrequently throughout the Proposed Project.	No
Active quarries and mines (ED4)	Local importance (lower value)	For all active rock or sediment quarries (including gravel pits) and mines, or parts of these, where levels of disturbance are so high that colonisation by plants and animals is almost entirely prevented. Accounted for 0.86ha (0.07%) of habitats within the Proposed Project.	This habitat was recorded from polesets 73B to 76B (Figure 8.8).	No

¹⁰ Vegetation community complexes developed by Kelly and Schouten (2002).

Site/Feature	Evaluation	Brief Description of Ecological Receptor	Relevant Location	Key Ecological Receptor(s)?
Reservoirs (FL7)	Parteen Basin forms part of the Lower River Shannon SAC. This water body is therefore of international importance.	All open water bodies that are used for the storage and supply of water. Accounted for 0.60ha (0.05%) of habitats within the Proposed Project.	Parteen Basin is the only habitat of this type within the Proposed Project.	Yes
Other artificial lakes and ponds (FL8)	Local importance (lower value)	Artificial lakes and ponds, used to describe natural depressions and pond areas. This habitat accounted for 0.18ha (0.01%) of habitats within the Proposed Project.	Recorded intermittently throughout the Proposed Project in Counties Tipperary, Offaly and Kildare.	No
Improved agricultural grassland (GA1)	Local importance (lower value)	Intensively managed grasslands that have been reseeded and/or regularly fertilised. The agricultural grasslands recorded within the Proposed Project are mainly used for grazing/silage making and are dominated by perennial rye-grass (<i>Lolium perenne</i>). Some areas were also found to support abundant rushes due to poorly drained soils. Accounted for 697.7ha (56.72%) of habitats within the Proposed Project.	Agricultural grassland was by far the most dominant habitat encountered throughout the Proposed Project.	No
Improved agricultural grassland and recolonising bare ground mosaic (GA1/GS2)	Local importance (lower value)	Habitat consisting of improved agricultural and meadow grassland. Accounted for 10.37ha (0.84%) of habitats within the Proposed Project.	At and surrounding the BPT and in Counties Offaly and Tipperary.	No
Improved agricultural grassland and wet grassland mosaic (GA1/GS4)	Local importance (lower value)	Wet or waterlogged agricultural grassland. This was recorded twice along the Proposed Project. Accounted for 15.08ha (1.23%) of habitats within the Proposed Project.	Recorded predominantly in County Offaly and in areas in Counties Kildare and Tipperary.	No
Amenity grassland (improved) (GA2)	Local importance (lower value)	Improved, or species-poor, grassland that is managed for purposes other than grass production such as recreational or landscaped grassland (gardens, parks etc.). Accounted for 0.27ha (0.02%) of habitats within the Proposed Project.	Recorded occasionally throughout the Proposed Project and mainly describes private gardens.	No
Dry calcareous and neutral grassland (GS1)	Local importance (higher value)	Unimproved or semi-improved dry grassland that may be either calcareous or neutral and tends to be associated with low intensity agricultural and free-draining mineral soils. None of the areas of GS1 encountered within the Proposed Project had a high species diversity. Accounted for 1.49ha (0.12%) of habitats encountered within the Proposed Project.	Discrete pockets throughout the Proposed Project.	Yes
Dry meadows and grassy verge (GS2)	Local importance (lower value)	This type of grassland is rarely fertilised or grazed and rarely mown. It is rare to find large meadows that are unimproved in Ireland; therefore, this type of grassland is now more typically associated with grassy roadside verges, railway embankments or some neglected fields or gardens, as was the case within the study area. This habitat accounted for 21.12ha / 327.01m (1.72% / 0.19%) of habitats within the Proposed Project.	Predominantly along roadsides throughout the Proposed Project.	No
Dry meadows and grassy verges and wet grassland mosaic (GS2/GS4)	Local importance (lower value)	Grassland which is rarely fertilised which also occurs in wet/waterlogged soil. Within the study area, it was typically associated with grassy roadside verges, railway embankments or some neglected fields or gardens. This habitat accounted for 2.46ha (0.2%) of habitats within the Proposed Project.	Recorded primarily along the 38 kV Uprate and also in Counties Tipperary and Kildare.	No
Dry meadows and grassy verges/recolonising bare ground (GS2/ED3)	Local importance (lower value)	Areas of recolonising bare ground transitioning into dry meadows and grassy verges. Accounted for 0.74ha (0.06%) of habitats within the Proposed Project.	This habitat was recorded two occasions near Chainages TWC – 20300 and along the R494 connecting the 38 kV Uprate and the RWI&PS.	No
Dry meadows and grassy verges, dense bracken and scrub mosaic (GS2/HD1/WS1)	Local importance (lower value)	Mosaic habitat consisting of grassland with dense bracken and scrub present. Accounted for 0.44ha (0.04%) of habitats within the Proposed Project.	Recorded on one occasion in Cushaling, County Offaly.	No
Dry-humid acid grassland (GS3)	Local importance (higher value)	This category refers to unimproved or semi-improved grassland that occurs on free-draining acid soils that may be dry or humid but not waterlogged. Accounted for 3.52ha (0.29%) of habitats within the Proposed Project.	Rathlumber and Cushaling County Offaly, Derrylahen County Kildare.	Yes
Wet grassland (GS4)	Local importance (higher value)	This habitat type occurs in wet or waterlogged mineral or organic soils that are poorly drained or subject to periodic flooding. It includes areas of poorly drained farmland that have not recently been improved. Wet grassland accounted for 70.75ha (5.75%), of the habitats encountered within the Proposed Project.	Common throughout the Proposed Project and dominant habitat within the WTP site.	Yes
Wet grassland and cutover bog mosaic (GS4/PB4)	Local importance (lower value)	Wet or waterlogged areas with peaty soils, of poorer ecological value. Accounted for 2.96ha (0.24%) of habitats within the Proposed Project.	Recorded on three occasions in Counties Offaly and Kildare.	No
Wet grassland and scrub mosaic (GS4/WS1)	Local importance (lower value)	Areas of wet or waterlogged soils which are poorly drained with areas of shrub, stunted tree and/or bramble. Accounted for 0.73ha (0.06%) of habitats within the Proposed Project.	This habitat was recorded on four occasions at polesets 100B and 101B, between polesets 69B and 70B, near Chainage TWC – 6500 and near Chainage TWC – 6300.	No
Dense bracken (HD1)	Local importance (lower value)	Open areas of vegetation dominated by bracken. Other species may be present but the cover of fern must be above 50%. Accounted for 0.57ha (0.05%) of habitats within the Proposed Project.	This habitat was recorded along the 38 kV Uprate and in Counties Tipperary and Offaly.	No
Dense bracken and scrub mosaic (HD1/WS1)	Local importance (lower value)	A mosaic habitat of bracken with shrubs, stunted trees, or brambles. This habitat accounted for 2.18ha (0.18%) of habitats within the Proposed Project.	This habitat was recorded on three occasions within the Proposed Project; near Chainage TW – 2400, between Chainages TWC – 20900 and TWC – 21300 and near Chainage TWC – 20300.	No
Dense bracken/dry siliceous heath (HD1/HH1)	Local importance (lower value)	Open areas of vegetation dominated by bracken with areas of ling heather, bell heather, bilberry and low-growing western gorse. Accounted for 0.15ha (0.01%) of habitats within the Proposed Project.	Recorded on one occasion in Cushaling, County Offaly.	No
Wet heath (HH3)	Local importance (higher value)	Vegetation with at least 25% cover of dwarf shrubs on peaty soils and shallow wet peats. This category accounted for 1.37ha (0.11%) of habitats within the Proposed Project.	This habitat was recorded in Kilkeaskin and Derrylahen, County Kildare.	Yes
Wet heath and raised bog mosaic (HH3/PB1)	County Importance	A mosaic habitat of heather recolonising on areas of raised bog. This category accounted for 0.11ha (0.01%) of habitats within the Proposed Project.	Recorded in Derrylahen, County Kildare.	Yes

Site/Feature	Evaluation	Brief Description of Ecological Receptor	Relevant Location	Key Ecological Receptor(s)?
Wet heath and cutover bog mosaic (HH3/PB4)	Local importance (higher value)	A mosaic habitat of heather recolonising on areas of degraded bog. This category accounted for 5.00ha (0.41%) of habitats within the Proposed Project.	Recolonising cutover bog where an extensive area can be found in the townland of Timahoe East, County Kildare.	Yes
Wet heath and bog woodland mosaic (HH3/WN7)	Local importance (higher value)	A mosaic habitat of heather with areas of woodland typical of bogs. This category accounted for 4.75ha (0.39%) of habitats within the Proposed Project.	Recolonising cutover bog where an extensive area can be found in the townlands of Kilkeaskin, Loughnacush, Parsonstown and Drehid, County Kildare.	Yes
Raised bog (PB1)	County Importance	Raised bogs are accumulations of acid peat that originated in shallow lake basins or topographic depressions and are at least 3m–12m deep. In all cases, raised bog habitats recorded within the Proposed Project had undergone drainage or cutting at some point in time. Survey data indicate these habitats did not conform with the Annex I habitat criteria for 'Active raised bogs (7110)'. This category accounted for 1.13ha, or 0.09%, of habitats within the Proposed Project (Appendix A8.4: Target Habitat Surveys Report).	Esler More, Clonarrow or Riverlyons and Island, Cushaling, County Offaly, and Derrylahen, Timahoe West, County Kildare.	Yes
Cutover bog (PB4)	Local importance (lower value)	This habitat category applies to bog areas where the original mass of peat has been removed via turf extraction. It includes areas where active peat extraction is occurring, as well as degraded bog habitats where past peat cutting has occurred. Cutover bog accounted for 29.17ha (2.37%) of habitats within the Proposed Project of which 26.6ha was considered to be local importance (lower value).	Common throughout the Proposed Project in Counties Offaly and Kildare.	No
Cutover bog (PB4)	Local importance (higher value)	This habitat category applies to bog areas where the original mass of peat has been removed via turf extraction. It includes areas where active peat extraction is occurring, as well as degraded bog habitats where past peat cutting has occurred. Cutover bog accounted for 29.17ha (2.37%) of habitats within the Proposed Project of which 2.57ha was considered to be local importance (higher value). The higher value habitat was as a result of rewetting and/or regeneration in these areas.	Rathlumber and Clonarrow or Riverlyons, County Offaly.	Yes
Cutover bog and other artificial lakes and ponds mosaic (PB4/FL8)	Local importance (higher value)	This habitat is due to the rewetting of cutover bog. Accounted for 4.32ha (0.35%) of habitats within the Proposed Project.	Recorded in Esler More, Ballykilleen and Ballynakill, County Offaly.	Yes
Cutover bog and drainage ditches mosaic (PB4/FW4)	Local importance (lower value)	Cutover bog containing a network of drainage ditches. Accounted for 6.99ha (0.58%) of habitats within the Proposed Project.	Clonad and Newtown, County Offaly.	No
Cutover bog and wet heath mosaic (PB4/HH3)	Local importance (lower value)	A mosaic habitat of degraded bog with areas recolonising with heather. Accounted for 1.20ha (0.10%) of habitats within the Proposed Project.	Timahoe East, County Kildare	No
Cutover bog and bog woodland mosaic (PB4/WN7)	Local importance (higher value)	This habitat category applies cutover bog being recolonised by bog woodland. Accounted for 57.73ha (4.69%) of habitats within the Proposed Project.	Extensive areas in Ticknevin, Kilpatrick and Cloncant, County Kildare.	Yes
Cutover bog and scrub mosaic (PB4/WS1)	Local importance (lower value)	Cutover bog that is likely no longer in use with recolonising areas of scrub. Accounted for 11.37ha (0.92%) of habitats within the Proposed Project.	Clonad, Island, Rathfeston and Esler More County Offaly.	No
Cutover bog, scrub, dry siliceous heath and dry meadows and grassy verges mosaic (PB4/WS1/HH1/GS2)	Local importance (lower value)	Habitat consisting of a cutover bog recolonising with scrub, heathland and grass species. Accounted for 0.29ha (0.02%) of habitats within the Proposed Project.	Timahoe East, County Kildare.	No
Poor fen and flush (PF2)	County	Poor fen and flush includes peat-forming and non-peat-forming fens and flushes that are fed by groundwater or flowing surface waters that are acidic. Within the Proposed Project, two small areas of this habitat, totalling 0.01ha, were identified within one land holding at Derryvarroge, County Kildare. These fen habitats were disturbed and grazed. Poor fen and flush habitat is not listed in Annex I of the Habitats Directive but is very limited in extent in Ireland and should be regarded as being of special conservation importance.	Derrylahen, County Kildare (Figure 8.95).	Yes
Highly modified/non-native woodland (WD1, WD2, WD3)	Local importance (higher value) – cumulatively	This category includes woodland areas with mixed stands of broadleaved trees and conifers of varying degrees of cover. These habitats accounted for 11.19ha (0.91%) (mixed) broadleaved trees (WD1), 4.45ha (0.36%) mixed broadleaved/conifer woodland (WD2) and 0.21ha (0.02%) (mixed) conifer woodland (WD3) within the Proposed Project.	This habitat was common throughout the Proposed Project.	Yes
Conifer plantation (WD4)	Local importance (lower value)	Areas that support dense stands of planted conifers where the broadleaved component is less than 25%. Accounted for 17.96ha (1.46%) within the Proposed Project.	This habitat was common throughout the Proposed Project.	No
(Mixed) broadleaved woodland and scrub mosaic (WD1/WS1)	Local importance (higher value)	Mixture of both broadleaved woodland that has isolated patches of scrub throughout. Accounted for 1.72ha (0.14%) of habitats within the Proposed Project.	Along the 38 kV Uprate and Finter, County Offaly.	Yes
Mixed broadleaved/conifer woodland and scrub mosaic (WD2/WS1)	Local importance (higher value)	Mixture of both broadleaved and conifer woodland that has isolated patches of scrub throughout. Accounted for 0.98ha (0.08%) of habitats within the Proposed Project.	Ballynakill, County Offaly	Yes
Hedgerows (WL1)/Treelines (WL2)	Local importance (higher value) – cumulatively	Hedgerows/treelines have been identified as occurring throughout the Proposed Project, ranging from low managed hedgerows to continuous mature treelines. In total, 64,568.32m (37.14%) of hedgerows and 42,526.79m (24.46%) of treeline occurs within the Proposed Project.	Commonly delineated field boundaries throughout the Proposed Project.	Yes
Hedgerows and stone walls and other stonework mosaic (WL1/BL1)	Local importance (higher value)	A linear mosaic consisting of a hedgerow with a stone wall beneath. Accounted for 245.48m (0.14%) of habitats within the Proposed Project.	These habitats were recorded on four occasions within the Proposed Project within the powerline west of TWA – 19200, at TWA – 14000, near TWA - 22000 and poleset 82B.	Yes
Hedgerows and earth banks mosaic (WL1/BL2)	Local importance (higher value)	A linear mosaic consisting of a hedgerow with earth banks beneath. Accounted for 176.49 (0.10%) of habitats within the Proposed Project.	This habitat was recorded intermittently throughout the Proposed Project near Chainage TWA – 22700, TWA – 21400, between poleset 54B and 55B, between poleset 36B and 37B, twice near poleset 29B and near Chainage TWB – 26200.	Yes
Hedgerows and dense bracken mosaic (WL1/HD1)	Local importance (higher value)	A linear mosaic consisting of a hedgerow and dense bracken. Accounted for 449.01m (0.26%) of habitats within the Proposed Project.	This habitat was recorded on five occasions within the Proposed Project south of Chainage RW – 1200, near Chainage TW – 600, near Chainage TW – 8400 and on two occasions at Chainage TW – 8400 and TW – 8500.	Yes

Site/Feature	Evaluation	Brief Description of Ecological Receptor	Relevant Location	Key Ecological Receptor(s)?
Treelines and stone walls and other stonework mosaic (WL2/BL1)	Local importance (higher value)	A linear mosaic consisting of a treeline with a stone wall beneath. Accounted for 271.2m (0.16%) of habitats within the Proposed Project.	This habitat was recorded on four occasions within the Proposed Project at poleset 249, near Chainage TWA – 24000, Chainage TWA – 18200 and TWA – 18300.	Yes
Treelines and earth banks mosaic (WL2/BL2)	Local importance (higher value)	A linear mosaic consisting of a treeline with earth banks beneath. Accounted for 720.79m (0.42%) of habitats within the Proposed Project.	This habitat was recorded on twelve occasions within the Proposed Project along the 38 kV Uprate Works at poleset 109B, near poleset 80B, at poleset 36B, poleset 9B, poleset 80B, poleset 59B and 60B, twice near Chainage RW – 100, Chainage TW – 13500, Chainage TWB – 5200 and TWB – 5600.	Yes
Oak-ash-hazel woodland (WN2)	Local importance (higher value)	Oak-ash-hazel woodland is described as native, semi-natural woodland that occurs on base-rich or calcareous soils that are generally dry or well-drained, or on rocky limestone terrain. It is dominated by pedunculate oak, ash, or hazel. Remnants of this habitat were present in small pockets throughout the Proposed Project and accounted for 0.76ha (0.06%) of the habitats encountered. Oak-ash-hazel woodland is not listed in Annex I of the Habitats Directive but is very limited in extent in Ireland and should be regarded as being of special conservation importance.	Discrete pockets in Counties Tipperary and Offaly and on the eastern bank of Parteen Basin along the northern boundary of the RWI&PS site.	Yes
Riparian woodland (WN5)	Local importance (higher value)	Within the Proposed Project this habitat was used to describe gallery woodland along riparian margins. 0.22ha (0.02%) of riparian woodland was recorded within the Proposed Project.	Recorded within counties Tipperary and Kildare (Figure 8.21 and Figure 8.96).	Yes
Wet willow-alder-ash woodland (WN6)	Local importance (higher value)	Woodlands of permanently waterlogged sites that are dominated by willows, alder or ash, or by various combinations of some or all of these trees. Accounted for 0.31ha (0.03%) of habitats within the Proposed Project.	Cloghanmore, County Offaly and along the route connecting the BPS to the existing Birr substation in Killaun, County Offaly.	Yes
Bog woodland (WN7)	Local importance (higher value)	This category includes woodlands of intact ombrotrophic bogs (i.e. soils or vegetation that receive all of their water and nutrients from precipitation rather than from streams or springs), bog margins and cutover bog. This habitat was present throughout the Proposed Project in areas of cutover bog and along bog margins. None of the bog woodland habitats recorded conformed with the priority Annex I habitat criteria for 'bog woodland (91D0)' (Appendix A8.4: Target Habitat Surveys Report). A total of 18.52ha (1.51%) of this habitat occurred within the Proposed Project.	Recorded within Counties Tipperary, Offaly and Kildare (Figure 8.4 to Figure 8.108)	Yes
Bog woodland and scrub mosaic (WN7/WS1)	Local importance (higher value)	Bog woodland that transitions into scrub in areas. This habitat was encountered on several occasions along the Proposed Project route. It consisted of a birch woodland with small amounts of willow and the understorey is beginning to dominate with large amounts of bramble and bracken. Accounted for 5.51ha (0.45%) of the Proposed Project.	Recorded within Counties Offaly and Kildare.	Yes
Scrub (WS1)	Local importance (higher value)	This habitat includes areas that are dominated by at least 50% cover of shrubs, stunted trees, or brambles. Scrub habitat occurs in patches throughout the Proposed Project where unmanaged areas such as cutover bogs and some agricultural edge habitats have developed a covering of shrubs. In total, 14.91ha / 297.30m (1.21% / 0.17%) of scrub occurs within the Proposed Project.	This habitat was common throughout the Proposed Project.	Yes
Immature woodland (WS2)	Local importance (lower value)	Immature woodland includes habitats that are dominated by sapling trees that have not yet reached threshold heights necessary for inclusion in other categories. In total, 3.03ha (0.25%) were noted within the Proposed Project.	Recorded along the 38 kV Uprate (Counties Tipperary and Clare) and in Counties Offaly and Kildare.	No
Short rotation coppice (WS4)	Local importance (lower value)	Short rotation coppice includes areas where frequent coppicing or harvesting of trees and shrubs prevents the development of mature woodland. Within the Proposed Project, this category describes two stands of biomass crops containing willows totalling 0.86ha (0.07%).	Recorded in Counties Offaly and Kildare (Figure 8.60 and Figure 8.89)	No
Recently-felled woodland (WS5)	Local importance (lower value)	Short rotation coppice includes areas where frequent coppicing or harvesting of trees and shrubs prevents the development of mature woodland. Accounted for 0.02ha (0.002%) of habitats within the Proposed Project.	Poleset 12B in Roo East, County Clare.	No
Watercourses (FW1, FW2, FW3) ranked as being of 'high ecological value'. I.e. larger streams, rivers and canals crossed by the Proposed Project (generally third order or greater, with known protected species and/or highly likely to support important fish stocks (Appendix A8.14: Watercourse Crossing Data))	International (cumulatively – for fisheries, habitats and protected fauna)	This habitat category includes eroding/upland rivers, depositing/lowland rivers, and canals. In-stream and riparian habitats are highly likely to support populations of and spawning/breeding areas for: Atlantic salmon, lamprey sp., European eel, brown trout, white-clawed crayfish and/or otter.	The Proposed Project crosses four eroding/upland rivers and 16 depositing/lowland rivers of 'high ecological value' across Counties Tipperary, Offaly, and Kildare and also crosses the Grand Canal at three locations (twice in County Kildare and once in County Dublin) and the Headrace on one occasion (in County Clare) – all 24 of these crossings were ranked as being of 'high ecological value'.	Yes
Watercourses (FW1, FW2, FW4) ranked as being of 'medium ecological value'. I.e. streams and small rivers crossed by the Proposed Project (generally first and second order, with moderate potential for protected species to occur (Appendix A8.14: Watercourse Crossing Data))	County (cumulatively – for fisheries, habitats and protected fauna)	This habitat category includes eroding/upland rivers, depositing/lowland rivers and drainage ditches. In-stream and riparian habitats have a moderate potential to support populations of and spawning/breeding areas for: Atlantic salmon, lamprey sp., European eel, brown trout, white-clawed crayfish and/or otter.	The Proposed Project crosses 13 eroding/upland rivers, 32 depositing/lowland rivers and 11 drainage ditches of 'medium ecological value' across Counties Tipperary, Offaly, and Kildare – all 56 of these crossings were ranked as being of 'medium ecological value'.	Yes

Site/Feature	Evaluation	Brief Description of Ecological Receptor	Relevant Location	Key Ecological Receptor(s)?
Watercourses (FW1, FW4) ranked as being of 'low ecological value'. I.e. small streams and drainage ditches crossed by the Proposed Project (first and second order only, with low potential for protected species to occur (Appendix A8.14: Watercourse Crossing Data))	Local importance (lower value) (higher value cumulatively – for fisheries, habitats and protected fauna)	This habitat category includes small eroding/upland rivers and drainage ditches. In-stream and riparian habitats have a low potential to support populations of and spawning/breeding areas for: Atlantic salmon, lamprey sp., European eel, brown trout, white-clawed crayfish and/or otter.	The Proposed Project crosses 12 depositing/lowland rivers, 12 eroding/upland rivers, and 535 drainage ditches of 'low ecological value' across Counties Tipperary, Offaly, Kildare and Dublin – all 559 of these crossings were ranked as being of 'low ecological value'.	Yes
Invasive Non-Native Species				
Himalayan balsam (<i>Impatiens glandulifera</i>)	Invasive non-native species (Unwanted)		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 (Table 8.30).	Yes
Giant hogweed (<i>Heracleum mantegazzianum</i>)	Invasive non-native species (Unwanted)		Giant hogweed was identified on occasion within the Proposed Project near Chainage TW – 1900 in Kilmastulla, County Tipperary.	Yes
Japanese knotweed (<i>Reynoutria japonica</i>)	Invasive non-native species (Unwanted)		Japanese knotweed was recorded on three occasions within the Proposed Project near Chainages TW – 700 and an area of 25m ² at TW – 2300 in Kilmastulla, County Tipperary, TWC – 21500 in Esker More, County Offaly and at the entrance to the WTP access road.	Yes
Rhododendron (<i>Rhododendron ponticum</i>)	Invasive non-native species (Unwanted)		Rhododendron was recorded on two occasions within the Proposed Project near poleset 79B in Fairyhall, County Limerick, poleset 99B in Birdhill, County Tipperary.	Yes
Nuttall's waterweed (<i>Elodea nuttallii</i>)	Invasive non-native species (Unwanted)		Nuttall's waterweed was recorded in small amounts in Parteen Basin at the RWI&PS site in water from 1.0 to 1.5m depth.	Yes
Protected Species				
Basil thyme (<i>Clinopodium acinos</i>)	Local importance (higher value)	Red Listed species as Near Threatened in Ireland (Wyse Jackson <i>et al.</i> 2016). Formerly protected under the Flora Protection Order 2015. This species is typically found in field margins and exposed sand, gravel or till.	This species was recorded both within and outside the boundary of the Proposed Project (Table 8.29) on exposed, sparsely vegetated mineral soils within Mount Lucas Wind Farm, County Offaly and Cushaling and Ticknevin, County Kildare.	Yes
Yellow archangel (<i>Lamiastrum galeobdolon subsp. montanum</i>)	Local importance (higher value)	Red Listed species as Least Concern in Ireland (Wyse Jackson <i>et al.</i> 2016). This species is typically found in woodlands, hedgerows, and roadsides.	This species was recorded once within the boundary of the Proposed Project (Table 8.29) within improved agricultural grassland near Chainage TW – 34100.	Yes
Bats	Lesser horseshoe bat – International (Annex II and IV of Habitats Directive and Wildlife Acts) Whiskered bat – County All other bat species – Local importance (higher value) (Annex IV of Habitats Directive and Wildlife Acts)	Mature linear woodland and deciduous and mixed woodland blocks afford possible roost sites. Hedgerows and watercourses provide foraging and commuting corridors.	A number of suitable habitats such as hedgerows, watercourses, and woodlands throughout the Proposed Project are used by commuting and foraging bats. Key locations include: Parteen woodland, Cangort, and Knockanacree Wood (Cloughjordan, County Tipperary). Various possible (at least temporary) roost sites were also identified (refer to Appendix A8.9: Bat Surveys Report).	Yes
Otter	International (Annex II and IV of Habitats Directive and Wildlife Acts)	Rivers, streams and associated riparian habitats crossed by the Proposed Project provide possible breeding and actual foraging areas for otter.	Parteen Basin, Kilmastulla River, Ardgregane Stream, Nenagh River, Camcor River, Little Brosna River, River Liffey, and tributaries of Kilmastulla River, Little Brosna and Silver River were noted for signs of otter. Sites with more potential as breeding sites, are larger river crossings.	Yes
Other faunal species protected under the Wildlife Acts	Local importance (higher value) (Wildlife Acts)	Species protected under the Wildlife Acts and occurring or potentially occurring within the Proposed Project include badger, Irish hare, hedgehog, red squirrel, pygmy shrew, Irish stoat, deer, pine marten, common frog, and smooth newt.	Identified in a number of locations throughout the Proposed Project from desktop records and/or field surveys.	Yes

Site/Feature	Evaluation	Brief Description of Ecological Receptor	Relevant Location	Key Ecological Receptor(s)?
White-clawed crayfish	International (Annex II and V of Habitats Directive and Wildlife Acts)	White-clawed crayfish is listed on Annex II and Annex V of the Habitats Directive and the species is protected in Ireland under the Wildlife Acts. The species is found in rivers, streams and lakes in Ireland particularly in those with a calcareous influence. The species prefers pH above 7 and calcium levels of minimum 5mg/L and generally good quality, cool water but can tolerate some variation. Watercourses crossed by the Proposed Project may provide suitable habitats for white-clawed crayfish.	- PSNWBX005 (38 kV) - PSNWBX007 (38 kV) - PSNWBX010 (38 kV) - PSNWCX001 (38 kV) - PSNWCX004 (38 kV) - WBX027 (TWA – 14800) - WBX030 (TWA – 21100) - WBX038 (TWB – 4600) - WBX039 (TWB – 4800) - WBX057 (TWC – 6900) - WBX058 (TWC – 10000) - WBX062 (TWC – 11100) - WBX088 (TWE – 14200) - WBX092 (TWB – 13600) - WBX094 (TWB – 19100) - WBX097 (TWC – 11000) - WBX107 (TWB – 4700) - WCX001 (power connection along R445) - WCX002 (access road) - WCX003 (TW – 700) - WCX004 (TW – 1000) - WCX005 (TW – 7500) - WCX006 (TW – 8500) - WCX013 (TW – 16500) - WCX016 (TW – 19500) - WCX021 (TW – 35000) - WCX026 (TWA – 13000) - WCX027 (TWA – 17500) - WCX029 (TWA – 24800) - WCX031 (TWA – 26000) - WCX032 (TWA – 27600) - WCX034 (TWB – 6600) - WCX035 (TWB – 7800) - WCX036 (TWB – 12600) - WCX039 (TWB – 24900) - WCX042 (TWC – 5000) - WCX048 (TWC – 18900) - WCX049 (TWC – 20300) - WCX056 (TWD – 4200) - WCX057 (TWD – 6400) - WCX059 (TWD – 14400) - WCX061 (TWD – 24300) - WCX062 (TWD – 26400) - WCX067 (TWE – 700) - WCX069 (TWE – 2400) - WCX070 (TWE – 3600) - WCX071 (TWE – 9000) - WCX072 (TWE – 9100) - WCX073 (TWE – 9800) - WCX074 (TWE – 11400) - WCX077 (power connection along R494) - WCX078 (power connection along the R440) - WCX085 (power to line valve TWC – 17500)	Yes
Freshwater pearl mussel	International (Annex II and V of Habitats Directive and Wildlife Acts)	The freshwater pearl mussel is a large filter-feeding bivalve, which is found in near-pristine freshwater habitats.	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.	No

Site/Feature	Evaluation	Brief Description of Ecological Receptor	Relevant Location	Key Ecological Receptor(s)?
Atlantic salmon	International (Annex II and V of Habitats Directive)	Atlantic salmon are predominantly anadromous, with offspring migrating to sea after a freshwater phase and adults returning to freshwater to breed. At younger stages shallower, well oxygenated, good quality, fast-flowing running freshwater ideally with a gravel or cobble bed is the ideal habitat. Later stage juveniles may require deeper freshwater habitats. Watercourses crossed by the Proposed Project may provide suitable habitats for Atlantic salmon.	• PSNWBX005 (38 kV) • PSNWBX010 (38 kV) • PSNWCX001 (38 kV) • PSNWCX002 (38 kV) • PSNWCX003 (38 kV) • PSNWCX004 (38 kV) • WBP011 (TWA – 15300) • WBP309 (TWC – 700) – Potential spawning only • WBX008 (TW – 3500) • WBX010 (TW – 4000) • WBX012 (TW - 4900) – Potential spawning habitat only • WBX025 (TWA – 12100) • WBX027 (TWA – 14800) – Potential spawning habitat only • WBX034 (TWA – 27200) – Potential spawning habitat only • WBX030 (TWA – 21100) • WBX038 (TWB – 4600) • WBX039 (TWB – 4800) • WBX057 (TWC – 6900) • WBX058 (TWC – 10000) • WBX060 (TWC – 10300) – Potential spawning habitat only • WBX061 (TWC – 10400) – Potential spawning habitat only • WBX062 (TWC – 11100) • WBX078 (TWD – 15100) • WBX092 (TWB – 13600) • WBX094 (TWB – 19100) • WBX097 (TWC – 11000) • WBX107 (TWB – 4700) • WBX109 (access route to TWD-14400) • WBX112 (power connection along R440) • WCX001 (power connection along R445) • WCX002 (access road along R445) • WCX003 (TW – 700) – Potential spawning habitat only • WCX004 (TW – 1000) • WCX005 (TW – 7500) – Potential spawning habitat only • WCX006 (TW – 8500) • WCX008 (TW – 10200) • WCX012 (TW – 15000) • WCX013 (TW – 16500) • WCX016 (TW – 19500) • WCX021 (TW – 35000) • WCX023 (TWA – 5600) • WCX024 (TWA – 8000) – Potential spawning habitat only • WCX025 (TWA – 9400) • WCX026 (TWA – 13000) – Potential spawning habitat only • WCX027 (TWA – 17500) • WCX028 (TWA – 23800) • WCX029 (TWA – 24800) • WCX031 (TWA – 26000) • WCX032 (TWA – 27600) • WCX033 (TWB – 1400) • WCX034 (TWB – 6600) • WCX035 (TWB – 7800) • WCX036 (TWB – 12600) • WCX039 (TWB – 24900) • WCX040 (TWC – 1000) – potential spawning habitat only • WCX041 (TWC – 3300) – potential spawning habitat only • WCX042 (TWC – 5000) • WCX045 (TWC – 9700) • WCX048 (TWC – 18900) • WCX049 (TWC – 20300) – potential spawning habitat only • WCX054 (TWC – 22800) – potential spawning habitat only • WCX056 (TWD – 4200) • WCX057 (TWD – 6400) • WCX058 (TWD – 8900) • WCX059 (TWD – 14400) • WCX060 (TWD – 18100) • WCX061 (TWD – 24300) • WCX062 (TWD – 26400) • WCX065 (TWD – 29100) • WCX066 (TWD – 32700) • WCX068 (TWE – 1800) • WCX069 (TWE – 2400) • WCX070 (TWE – 3600) • WCX073 (TWE – 9800) • WCX077 (power connection along R494)) • WCX078 (power connection along R440) • WCX079 (power to line valve TWD – 8000) • WCX082 (power to line valve TWC – 22900) • WCX083 (power to line valve TWD – 12700) • WCX085 (power to line valve TWC - 17500)	Yes

Site/Feature	Evaluation	Brief Description of Ecological Receptor	Relevant Location	Key Ecological Receptor(s)?
Lamprey species	International importance (Annex II of Habitats Directive)	Sea lamprey grow to maturity in the sea and migrate to freshwater to spawn. River lamprey grow to maturity in estuaries and migrate to freshwater to spawn. Brook lamprey (the most widespread of the three species) are non-anadromous, i.e. they do not migrate up rivers from the sea to spawn. Lampreys spawn in similar habitats to salmonids. The most important factors involved in the location of the spawning ground are the presence of a suitable clean substrate for the construction of redds and a relatively stable current flow. Small amounts of sand are also needed to which the eggs adhere. Watercourses crossed by the Proposed Project may provide suitable habitats for lamprey species.	• PSNWBX005 (38 kV) • PSNWBX010 (38 kV) • PSNWCX001 (38 kV) • PSNWCX002 (38 kV) • PSNWCX003 (38 kV) • WBP309 (TWC – 700) – Potential spawning habitat only • WBX001 (access road) • WBX002 (access road) • WBX008 (TW – 3500) • WBX010 (TW – 4000) – Potential spawning habitat only • WBX017 (TW – 19200) • WBX023 (TWA – 7800) • WBX026 (TWA – 13200) • WBX027 (TWA – 14800) • WBX030 (TWA – 21100) • WBX033 (TWA – 21300) • WBX034 (TWA – 27200) • WBX038 (TWB – 4600) • WBX039 (TWB – 4600) • WBX057 (TWC – 6900) • WBX058 (TWC – 10000) • WBX060 (TWC – 10300) – Potential spawning habitat only • WBX061 (TWC – 10400) – Potential spawning habitat only • WBX062 (TWC – 11100) • WBX088 (TWE – 14200) • WBX092 (TWB – 13600) • WBX093 (TWB – 14800) • WBX094 (TWB – 19100) • WBX097 (TWB – 11000) • WBX107 (TWB – 4700) • WCX001 (power connection along R445) • WCX002 (access road) • WCX003 (TW – 700) • WCX004 (TW – 1000) • WCX005 (TW – 7500) • WCX006 (TW – 8500) • WCX008 (TW – 10200) • WCX009 (TW – 10500) • WCX010 (TW – 11200) • WCX012 (TW – 15000) – potential spawning habitat only • WCX013 (TW – 16500) • WCX016 (TW – 19500) • WCX021 (TW – 35000) • WCX023 (TWA – 5600) • WCX024 (TWA – 8000) – Potential spawning habitat only • WCX026 (TWA – 13000) • WCX027 (TWA – 17500) • WCX028 (TWA – 23800) – Potential spawning habitat only • WCX029 (TWA – 24800) • WCX031 (TWA – 26000) – Potential spawning habitat only • WCX032 (TWA – 27600) • WCX033 (TWB – 1400) • WCX034 (TWB – 6600) • WCX035 (TWB – 7800) • WCX036 (TWB – 12600) • WCX039 (TWB – 24900) • WCX040 (TWC – 1000) – potential spawning habitat only • WCX041 (TWC – 3300) – potential spawning habitat only • WCX042 (TWC – 5000) • WCX043 (TWC – 5600) • WCX044 (TWC – 8900) • WCX045 (TWC – 9700) • WCX048 (TWC – 18900) • WCX049 (TWC – 20300) • WCX054 (TWC – 22800) • WCX056 (TWD – 4200) • WCX057 (TWD – 6400) • WCX058 (TWD – 8900) • WCX059 (TWD – 14400) • WCX061 (TWD – 24300) • WCX062 (TWD – 26400) • WCX064 (TWD – 28500) • WCX065 (TWD – 29100) • WCX066 (TWD – 32700) • WCX068 (TWE – 1800) • WCX069 (TWE – 2400) • WCX070 (TWE – 3600) • WCX073 (TWE – 9800) • WCX077 (power connection along R494)) • WCX078 (power connection along R440) • WCX079 (power to line valve TWD – 8000) • WCX085 (power to line valve TWC – 17500)	Yes
European eel	County importance	The European eel is listed as critically endangered and is protected under the Wildlife Acts. Eels have a catadromous life cycle, which means they spawn in the sea and migrate into freshwater to feed and grow. Eel was recorded on the Clodiagh River within the Proposed Project, however, considering the suitable habitat available the species is likely to occur throughout the study area.	Eel was recorded on one occasion on the Clodiagh River at the water body crossing WCX039 (TWB – 24788).	Yes
Pollan	National importance	Pollan, a glacial relict, has been recorded Lough Neagh, Lough Erne, Lough Ree and Lough Derg. It is not known to occur in Parteen Basin.	Upstream of the Proposed Project in Lough Derg. Not known to occur within the Zol of the Proposed Project.	No

Site/Feature	Evaluation	Brief Description of Ecological Receptor	Relevant Location	Key Ecological Receptor(s)?
All other fish species	Local importance (higher value)	Other fish species such as brown trout, stone loach, three-spined stickleback, minnow, roach, perch and pike. These fish species are common and are likely to occur frequently throughout the study area. Watercourses crossed by the Proposed Project may provide suitable habitats for these fish species.	Identified in a number of locations throughout the Proposed Project from desktop records and/or field surveys.	Yes
Marsh fritillary	International (Annex II of Habitats Directive)	Marsh fritillary butterfly protected under Annex II of the Habitats Directive and occurring or potentially occurring within the Proposed Project.	Marsh fritillary were identified in a number of locations within the Proposed Project in Ticknevin and Derrinboy County Offaly.	Yes
Mollusc species	County importance <i>Vertigo</i> species – International (Annex II of Habitats Directive)	Whorl snail (<i>Vertigo</i> species) protected under Annex II of the Habitats Directive and occurring or potentially occurring within the Proposed Project. Lilljeborg’s whorl snail, a rare whorl snail which was assessed in the Irish Red List as Vulnerable and brown snail, also assessed in the Irish Red List as Vulnerable.	None of the three protected <i>Vertigo</i> species (narrow-mouthed whorl snail, Geyer’s whorl snail or Desmoulin’s whorl snail) were recorded within the Zol of the Proposed Project. Suitable habitat for Desmoulin’s whorl snail and Geyer’s whorl snail was found at Raheenduff, County Offaly, while suitable habitat for Desmoulin’s whorl snail was found at Coolfin Glebe. Despite the presence of suitable habitat, however, these species were not present. Based on the results of the survey, the Proposed Project would not impact on any populations of these three Annex II <i>Vertigo</i> species. Lilljeborg’s whorl snail and brown snail were both recorded at the RWI&PS site.	Yes
Protected Breeding Bird Species				
Parteen Basin, RWI&PS and the Route of the Treated Water Pipeline				
Barn owl, black-headed gull, coot, curlew, great crested grebe, kestrel, kingfisher, lapwing, mallard, mute swan, ringed plover, sand martin, snipe, woodcock, grey wagtail, meadow pipit, yellowhammer	Local importance (higher value)	Red and Amber Listed species on BoCCI – these species were regularly recorded, and evidence of breeding activity was observed. They were determined to be most at risk from the Proposed Project, due to their ecology (e.g. ground nesters), their global and Irish conservation status, or are more sensitive to disturbance or displacement. Therefore, these species are considered to be of local importance (higher value).	These species have been identified in a number of locations throughout the Proposed Project (Appendix A8.21: Breeding Bird Surveys Summary Report).	Yes
Hen harrier	Local importance (higher value)	Annex I listed species and Amber Listed on BoCCI – the species was observed irregularly over the survey period, but the Proposed Project and wider surroundings contain potentially suitable foraging habitat for this species. This species is considered to be of conservation concern in Ireland and listed on Annex I of the Birds Directive, but due to the lack of evidence of breeding activity and the irregular observations it is consequently of local importance (higher value).		Yes
Peregrine falcon	Local importance (higher value)	Annex I listed species and Green Listed on BoCCI – the species was observed infrequently over the survey period, but the Proposed Project and wider surroundings contain potentially suitable foraging habitat for this species. The species was also confirmed breeding at a known nest site within 1km of the Proposed Project in County Offaly. This species is considered to be of conservation concern in Ireland and is listed on Annex I of the Birds Directive, but due to the limited records of breeding activity and the irregular observations it is consequently of local importance (higher value).		Yes
Black-tailed godwit, common sandpiper, common tern, cormorant golden plover, grey partridge herring gull, lesser black-backed gull, merlin, redshank, shoveler, teal, tufted duck	Local importance (higher value)	Red Listed species on BoCCI – although these species are considered to be of conservation concern in Ireland, they were irregularly recorded over the survey period and no breeding evidence was observed. However, as all wild birds, their nests and important habitats are protected under the Wildlife Acts, these species are considered to be of local importance (higher value).		Yes
Other species of low conservation significance	Local importance (higher value)	Other species of low conservation significance are target species which are determined to be less at risk from potential impacts associated with the Proposed Project, as they have a more favourable conservation status, were rarely recorded during surveys, or are not thought to be dependent on the area for breeding or feeding. However, as all wild birds, their nests and important habitats are protected under the Wildlife Acts, these species are considered to be of local importance (higher value).		Yes
38 kV Uprate Works				
Black-headed gull, common gull, coot, cormorant, curlew, grey wagtail, herring gull, kestrel, kingfisher, lapwing, lesser black-backed gull, mallard, meadow pipit, mute swan, redshank, snipe	Local importance (higher value)	Red and Amber Listed species on BoCCI – these species were regularly recorded, and/or evidence of breeding activity was observed. They were determined to be most at risk from the Proposed Project, due to their ecology (e.g. ground nesters), their global and Irish conservation status, or are more sensitive to disturbance or displacement. Therefore, these species are considered to be of local importance (higher value).	These species have been identified in a number of locations throughout the Proposed Project (Appendix A8.21: Breeding Bird Surveys Summary Report).	Yes
Other species of low conservation significance	Local importance (higher value)	Other species of low conservation significance are target species which are determined to be less at risk from potential impacts associated with the Proposed Project, as they have a more favourable conservation status, were rarely recorded during surveys, or are not thought to be dependent on the area for breeding or feeding. However, as all wild birds, their nests and important habitats are protected under the Wildlife Acts, these species are considered to be of local importance (higher value).		Yes

Site/Feature	Evaluation	Brief Description of Ecological Receptor	Relevant Location	Key Ecological Receptor(s)?
Protected Winter Bird Species				
Parteen Basin, RWI&PS and the Route of the Treated Water Pipeline				
Mute swan, tufted duck	National importance	Amber Listed species on BoCCI – these species were regularly recorded exceeding the national population threshold within Parteen Basin over a number of survey seasons, therefore are considered of national importance. They were irregularly recorded and in lower number along the route of the Proposed Project.	These species have been identified in a number of locations throughout the Proposed Project (Appendix A8.22: Winter Bird Surveys Summary Report).	Yes
Black-headed gull, coot, cormorant, curlew, gadwall, golden plover, goldeneye, great crested grebe, hen harrier, herring gull, lapwing, lesser black-backed gull, mallard, pochard, redshank, shoveler, snipe, teal, whooper swan, wigeon	Local importance (higher value)	Red and Amber Listed species on BoCCI – these species were regularly recorded, over the survey period. They were determined to be most at risk from the Proposed Project, due to their ecology (e.g. flocking behaviour during the winter), their global and Irish conservation status, or are more sensitive to disturbance or displacement. Therefore, these species are considered to be of local importance (higher value).		Yes
Other species of low conservation significance	Local importance (higher value)	Other species of low conservation significance are target species which are determined to be less at risk from potential impacts associated with the Proposed Project, as they have a more favourable conservation status, were rarely recorded during surveys, or are not thought to be dependent on the area for roosting or feeding. However, as all wild birds, their nests and important habitats are protected under the Wildlife Acts, these species are considered to be of local importance (higher value).		Yes
38 kV Uprate Works				
Cormorant, common sandpiper, curlew, green sandpiper, great crested grebe, greylag goose, goldeneye, goosander, lapwing, little grebe, mallard, moorhen, mute swan, pochard, redshank, snipe, scaup, teal, tufted duck, wigeon, whooper swan	Local importance (higher value)	Red, Amber and Green Listed species on BoCCI – these species were regularly recorded over the survey period and/or were determined to be most at risk from the Proposed Project, due to their ecology (e.g. flocking behaviour during the winter or flight patterns), their global and Irish conservation status, or are more sensitive to disturbance or displacement. Therefore, these species are considered to be of local importance (higher value).	These species have been identified in a number of locations throughout the Proposed Project (Appendix A8.22: Winter Bird Surveys Summary Report).	Yes
Other species of low conservation significance	Local importance (lower value)	Other species of low conservation significance are target species which are determined to be less at risk from potential impacts associated with the Proposed Project, as they have a more favourable conservation status, were rarely recorded during surveys, or are not thought to be dependent on the area for roosting or feeding. However, as all wild birds, their nests and important habitats are protected under the Wildlife Acts, these species are considered to be of local importance (higher value).		No

8.3.7 Future Baseline

499. The current land use provides the best indication of what the future short to medium-term biodiversity trends might be, as they will influence and direct development in the surrounding area.
500. Current biodiversity trends are likely to continue or improve in areas of agriculture. Provisions are being made to incentivise farmers to create and maintain habitats on farms as part of Ireland's Climate Action Plan and the Rural Development Plan, which would be expected to result in commitments for supporting biodiversity conservation or restoration including high-nature-value farming practices.
501. With regards forestry, the National Development Plan 2021 – 2030 and the Forestry Programme 2023 – 2027 outline the policy for and investment to increase forestry cover. The Forestry Programme has been designed to make a significant contribution to Ireland's biodiversity objectives. The Programme will facilitate the creation of new forest habitats at scale, with generous incentives for farmers and public bodies to plant mixed native woodlands on suitable land, as well as 20-year payments for farmers to retain and promote emergent woodland on their land. For existing forest owners, measures under the Forestry Programme such as the Native Woodland Conservation Scheme, the Woodland Improvement Scheme and other sustainable forest management practices will likely aid in the protection and enhancement of biodiversity.
502. Residential and amenity areas are likely to increase in response to the government's housing policy and plan to 2030 (Housing for All - a New Housing Plan for Ireland). However, there is a focus on sustainable levels of housing output in the right places, and it is expected development will largely take place in cities, towns, and villages in accordance with the United Nations 'Sustainable Development Goals'.
503. Commercial peat harvesting activities ceased along the Proposed Project in 2019. Where commercial peat harvesting activity has ceased, a Rehabilitation Plan or Enhanced Rehabilitation Plan as part of the Peatlands Climate Action Scheme has been or will be implemented on Bord na Móna's EPA licensed sites. The Peatlands Climate Action Scheme encompasses the restoration and rehabilitation of approximately 33,000ha of Bord na Móna peatlands that were previously harvested to generate electricity. Through the scheme, Bord Na Móna is reassigning employees from harvesting operations into rehabilitation in order to support the natural environment and biodiversity of the peatlands. To date, approximately 14,344ha have been rehabilitated across 30 bogs with plans approved for a further five sites, with four undergoing approvals. Works are expected to be completed by mid-2026. Rehabilitation plans are designed to result in an overall increase in biodiversity. Peat production fields will gradually recolonise by vegetation (heath or scrub) and start to rewet (due to drain blocking). It is reasonable to assume that the remaining peat extraction areas would naturally revegetate in a 10 to 20 year time period. The future baseline scenario on the Bord Na Móna sites will comprise a mosaic of wetland, wet peatland, heath, scrub and woodland habitats depending on the various constraints such as topography, surface water and groundwater levels. These habitat changes are likely to have a positive effect on fauna biodiversity and distributions locally.
504. In relation to the future baseline, a review was undertaken of the National Biodiversity Action Plan 2023 – 2030. Investment is being provided to support the objectives of this plan, including measures to conserve and restore peatlands and wetlands, combat the spread of invasive alien species, implement Local Biodiversity Action Plans and invest in agri-environment schemes. Several initiatives have been launched, including the Kunming-Montreal Global Biodiversity Framework, the EU Green Deal and its supporting EU Biodiversity Strategy, a new Common Agricultural Policy Strategic Plan, the Climate Action Plan and an updated Forestry Programme. These developments are reflected throughout the National Biodiversity Action Plan 2023 – 2030 and aim to address biodiversity loss and restore ecosystems.

505. On the 27 February 2024, the Nature Restoration Law was passed in the European parliament. By 2030, this law aims to restore 20% of the sea and land habitats across the EU. To reach the overall EU targets, member states must restore at least 30% of habitats covered by the new law (from forests, grasslands and wetlands to rivers, lakes and coral beds) from a poor to a good condition by 2030, increasing to 60% by 2040, and 90% by 2050. In Ireland, the Irish government made the National Biodiversity Action Plan for 2023 – 2030. Under this plan, an action was announced on the 4 March 2024, to fund local biodiversity action plans across Ireland. As a result, it is expected there will be an increase in restoration and enhancement of biodiversity in agricultural and forestry ecosystems in the medium to long-term.

8.4 Do-Nothing Scenario

506. The 'Do-Nothing' scenario describes the circumstance where no development occurs. In the case where the Proposed Project is not built, there would continue to be changes in biodiversity or ecological value as a result of ongoing land management. The majority of lands within the footprint of the Proposed Project would continue to be managed intensively for agriculture (pastoral and arable farming). Possible changes in management could include further land drainage, scrub clearance and afforestation, and development including commercial, industrial or residential dwellings, the majority of which would have a localised negative effect on ecological value/biodiversity of the area. With the exception of development overlapping with the footprint of the Proposed Project, it is not expected that these changes in land use would be influenced by whether the Proposed Project proceeds or not.
507. The future baseline is set out in Section 8.3.7, while the interaction between the Proposed Project and other plans or projects are considered and assessed further in Chapter 21 (Cumulative Effects & Interactions).

8.5 Construction Phase Assessment of Effects

508. The following section presents the assessment of effects on biodiversity within the Zol of the Proposed Project during the Construction Phase (which includes the Testing and Commissioning Phase; see Section 8.6). The assessment is divided into impacts on:
- Designated Areas of Nature Conservation (Section 8.5.1)
 - Terrestrial Ecology (Section 8.5.2)
 - Terrestrial habitats
 - Habitats and flora
 - Mammals
 - Bats
 - Eurasian badger
 - Otter
 - Other mammal species
 - Invertebrates
 - Lepidoptera
 - Molluscs
 - Other species groups
 - Reptiles and amphibians
 - Aquatic Ecology (Section 8.5.3)
 - Aquatic habitats and plant communities

- Aquatic macroinvertebrates
- Protected aquatic species
- Invasive non-native aquatic species
- Ornithology – Breeding Birds (Section 8.5.4)
- Ornithology – Wintering Birds (Section 8.5.5).

509. The identification and description of impacts presented below takes into account the characteristics of the receiving environment as described in Section 8.3, with particular reference to the KERs (Section 8.3.6). The assessment in this section accounts for embedded mitigation that has been incorporated into the design (e.g. site and pipeline route selection during the optioneering stages to avoid sensitive ecological features) but represents a pre-mitigation assessment for potential effects on biodiversity. Section 8.8 to Section 8.10 describe mitigation measures and Section 8.11 describes residual effects following the implementation of mitigation measures.
510. Details of the construction of the Proposed Project can be found in Chapter 5 (Construction & Commissioning). In addition to setting out the proposed construction works, Chapter 5 includes details on commissioning works necessary for assuring that systems and components meet the operational requirements for service.
511. Based on the nature of the Proposed Project and the baseline ecological data collected in the study area, the potential Construction Phase impacts are summarised in Section 8.5.1 to Section 8.5.5. The potential Construction Phase impacts and effects on each of the KERs are described herein.
512. Potential impacts to both terrestrial and aquatic biodiversity associated with the construction of the Proposed Project are discussed below:
- Permanent habitat loss associated with the construction (site clearance and site access) of key infrastructure within the defined works area for the Proposed Project
 - RWI&PS (2.6ha for the site and 1.4ha for the access road)
 - WTP (29.1ha for the site and 1.9ha for the access road)
 - BPT (5.2ha for the site and 1.8ha for the access road)
 - BPS (2.6ha)
 - FCV (0.5ha for the site)
 - TPR (7.5ha and 0.9ha for the access road)
 - Line Valves (3,315m², approximately 65m² concrete area at surface and 51 Line Valves in total)
 - Air Valve chambers (22,896m², approximately 72m² for each Air Valve and 289 Air Valves in total)
 - Washout Valve chambers (1,634m², approximately 7.1m² for above-ground features and 187 Washout Valves in total)
 - Temporary habitat loss/disturbance associated with construction activities including stockpiling of material, open-cut trench excavation, trenchless excavation, and shallow trench excavation in peat bog
 - Temporary habitat loss/disturbance associated with laying of Temporary Construction Roads and trimming of vegetation to widen existing access gaps in hedgerows (if necessary) or removal of overhanging tree branches/tree lopping
 - Temporary habitat loss/disturbance associated with the clearance or trimming of vegetation including overhanging tree branches along the Proposed Project

- Temporary habitat loss/physical disturbance to the aquatic environment in Parteen Basin during the placing of a temporary piling platform to allow secant pile construction along the shoreline
- Permanent/temporary habitat loss may also lead to permanent/temporary habitat fragmentation (i.e. loss of connectivity of habitat) by creating new divisions of existing habitat blocks or contributing to an existing trend of fragmenting semi-natural habitat blocks
- Temporary disturbance to the aquatic environment surrounding the secant piles and temporary piling platform, associated with the construction of the Raw Water Pumping Station substructure, including dredging over an area of approximately 70m by 25m once the Intake Chamber and Pumping Station substructure is completed and the platform is removed
- Temporary noise and vibration disturbance to the surrounding aquatic and terrestrial biodiversity from construction works, including piling works along the shoreline
- Temporary noise, vibration and physical presence disturbance impacts to fauna from machinery and staff undertaking works
- Permanent disturbance/displacement to the aquatic environment surrounding the Intake due to the operational noise of water pumps in Parteen Basin and the proposed bubble curtain to deter fish from entering the Intake.
- Permanent/temporary loss of resting places or commuting and/or foraging habitat for EU and Irish protected species and also non-protected fauna
- Pollution risks to water quality in Parteen Basin from construction works including leaks or spills, disturbance of sediment within the basin and runoff from terrestrial areas (shoreline)
- Pollution runoff risks to surface water quality and associated biodiversity through drains, watercourses, and water bodies within and downstream of the working areas
- Pollution runoff risks to surface water quality and associated biodiversity through commissioning of the pipeline (i.e. twin RWRMs, Treated Water Pipeline)
- Pollution runoff risks to groundwater quality in the ZoI of works area and also potentially linked to groundwater-fed wetlands and other surface water features
- Alteration of surface water drainage patterns from pipeline works and access roads that may increase or decrease localised drainage to/from areas, thereby potentially affecting surface water dependent ecosystems
- Alteration of groundwater flows from pipeline works thereby affecting GWDTEs
- Disturbance from security and/or night-time lighting along the Proposed Project
- Risk of introduction/spread of INNS or pathogens to the surrounding aquatic and terrestrial environment
- Mortality of aquatic and terrestrial fauna and/or loss or reduction in extent of protected flora species.

513. The construction impacts associated with the 38 kV Uprate Works are expected to be short-term. Wooden polesets that need replacing would be brought to the construction site within one day of delivery and erected within one day also. The line uprate would occur in sections between angle masts with each completed before the next section. Once all works are complete, the access tracks and construction areas would be restored to their original condition. Based on ESNB's experience of similar works on 38 kV infrastructure, it is anticipated that the proposed uprate works would take up to 12 months to construct.

8.5.1 Designated Areas of Nature Conservation

514. This section describes and assesses the potential for the Proposed Project to result in likely significant effects on designated areas for nature conservation, including SACs, SPAs, NHAs and pNHAs. With regard to European sites, this is focused on the habitats and species for which the sites are selected and the conservation objectives supporting the conservation status for each site. Consideration was also given to undesignated habitats and species which are necessary to the conservation of the habitat types and species listed for the protected area. The Proposed Project's potential effect on European sites and protected species has also been assessed separately in the NIS in line with the requirements of Part XAB of the Planning Acts and the Birds Directive and Habitats Directive.
515. In the case of NHAs and pNHAs, the assessment considers whether the Proposed Project would have a likely significant effect on the coherence of ecological structure and function across the entirety of a site that enables it to sustain all of the biodiversity or ecological resources for which it has been valued (NRA 2009a), with reference to the ecological features of interest for which the site is designated, or is proposed.

8.5.1.1 European Sites

516. The nature and scale of the Proposed Project, and the identified potential impacts in relation to European sites, were considered in order to determine which European sites were within the Zol of the Proposed Project. This was carried out in view of best scientific knowledge and conservation objectives. The potential impacts associated with the Proposed Project are discussed below in relation to those European sites within its Zol (see also Section 5 of the NIS).
517. The Zol is a distance within which the proposed works could potentially affect the conservation condition of qualifying interest habitats or qualifying interest/special conservation interest species of a European site. The mechanism to define the Zol (as discussed in Section 8.2.2) is summarised as follows:
- Consider the nature, size and location of the Proposed Project
 - Consider the sensitivities of the ecological receptors
 - Identify impact sources and pathways
 - Determine the Zol based on the extent of the impact.
518. Considering the Zol in the absence of mitigation measures, the Proposed Project was assessed as having the potential for likely significant effects on the following 19 European sites (refer to Section 6.2 of the Appropriate Assessment Screening Report):
- Lower River Shannon SAC [002165]
 - Lisduff Fen SAC [002147]
 - Sharavogue Bog SAC [000585]
 - River Barrow and River Nore SAC [002162]
 - Lough Derg, North-East Shore SAC [002241]
 - Rye Water Valley/Carnton 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]
- Poulaphouca Reservoir SPA [004063]
- Middle Shannon Callows SPA [004096].

519. The potential impacts on these European sites are discussed below under the following headings:

- Habitat Loss and Fragmentation
- Habitat Degradation as a Result of Excavation and Tunnelling
- Habitat Degradation as a Result of Hydrological Impacts
- Habitat Degradation as a Result of Air Quality Impacts
- Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species and Pathogens
- Disturbance/Displacement
- Mortality Risk from Construction Work and Traffic
- Barrier Effect.

520. It should be noted, the footprint of the Proposed Project overlaps with only one European site, the Lower River Shannon SAC (as discussed in Section 8.3.1). Many of the qualifying interests of the Lower River Shannon SAC are marine/coastal in origin and do not occur within the Zol of the Proposed Project; therefore, there is no potential for the Proposed Project to have a likely significant effect on these qualifying interests (see Section 7.1 of the NIS).

8.5.1.1.1 Habitat Loss and Fragmentation

521. The Proposed Project overlaps with the Lower River Shannon SAC at the RWI&PS site at Parteen Basin, 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 (WCX077). In addition, the power connection for the WTP, which would be taken from the existing Birdhill 38 kV Substation, would also cross the Kilmastulla River (WCX001). This crossing, using horizontal directional drilling, would be made immediately upstream of the bridge carrying the R445 across the river. 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. The Proposed Project does not directly impact upon or result in habitat loss or fragmentation of any other SAC site.

522. There are no areas of qualifying interest Annex I habitats within the Lower River Shannon SAC that lie beneath the footprint of the RWI&PS or that would be directly impacted. Neither would the RWI&PS result in the direct loss of any habitats that support the qualifying interest habitats that are present 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.

523. 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 (with an additional 1ha required for construction), 1.38ha (0.78ha of terrestrial habitat and 0.6ha of aquatic habitat) of which is located within the boundaries of the Lower River Shannon SAC. There would be a permanent loss of terrestrial habitat on the bank of Parteen Basin within the SAC following the construction of the RWI&PS associated infrastructure (0.55ha), while the remainder of the terrestrial habitats within the footprint will be temporarily lost. Habitat loss/fragmentation of habitat supporting qualifying interest species (e.g. otter habitat and/or breeding/resting sites) of the Lower River Shannon SAC, has the potential to result in a short-term to permanent, likely significant negative effect, at the international geographic scale.
524. The 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 cross-arm 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 trenchless methods across the Kilmastulla River (WCX077). A maximum temporary ground disturbance or working area of 0.28ha would occur within the immediate vicinity (30m radius) of each poleset that requires work to fittings within the SAC (polesets 67B to 69B). In total, this equates to 0.55ha of temporary disturbance to the KER habitat wet grassland (GS4). 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. However, 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 also be limited and set back from qualifying interest Annex I habitat locations. Temporary habitat loss (in less than 10 consecutive days of night-time working) would be required along the route of the 20 kV cable, either side of the watercourse crossing (i.e. at launch and reception shafts). However, 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. Thus, given the aforementioned detail, habitat loss/fragmentation impacts on vegetation within the Lower River Shannon SAC will not result in a likely significant negative effect, at any geographic scale.
525. The Proposed Project does 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. It is therefore considered that connectivity could exist between the Proposed Project and these SPAs. 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 8.5.1.1.2 to Section 8.5.1.1.6. 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 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 used by the special conservation interest species.

8.5.1.1.2 Habitat Degradation as a Result of Excavation and Tunnelling

526. 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 lie within or have a pathway to a European site(s) and have the potential to give rise to this type of impact.
527. The proposed 38 kV Uprate Works 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 trenchless methods across the Kilmastulla River (WCX077) 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 8.5.1.1.1.
528. The design of the RWI&PS requires the Inlet Chambers to be constructed on the banks of Parteen Basin. To accommodate the intake works the main earthworks operations would entail excavation of the areas of the groundwater settlement basins, the footprint of the RWI&PS intake chamber and substructures, and the Raw Water Rising Mains Scour Tank, Microfiltration Buildings and Invasive Species Debris Retention Tank. Given the depth of the excavation of approximately 15m below ground level required at the main Raw Water Pumping Station Building substructure, the construction techniques that would be employed would be piling and excavation. The boundary of the structure would be constructed by secant piles to minimise the extent of excavation. The material inside the piled walls would then be excavated and the Raw Water Pumping Station Building substructure could be constructed, using the piled walls as removable temporary works or permanent formwork, if necessary. 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. 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 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.
529. The use of a secant piles to construct the RWI&PS would minimise the potential effects associated with excavation in Parteen Basin. There is still potential for negative effects on the water quality of Parteen Basin from the installation works and temporary piling platform (mobilisation of sediments) and the barge or pontoon (oil, chemicals and wastewater) 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. Habitat degradation associated with excavation at the RWI&PS has the potential to result in a temporary, likely significant negative effect, at the international geographic scale.
530. Where tunnelling is required (i.e. trenchless construction using micro-tunnelling methods) under major crossings such as canals and watercourses, 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.

Trenchless construction would be employed at 13 major watercourse crossings and/or watercourses considered to be of high ecological value (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, however no works would take place within the boundary of the SAC at this location).

531. Habitat degradation associated with trenchless construction under watercourses has the potential to result in a short-term, likely significant negative effect at a local geographic scale.

532. The remaining watercourses that intersect the route of the Proposed Project would be crossed via open-cut techniques, bridges, or by OHLs (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 has 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. 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. The watercourses (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; see Section 6.2 of the NIS. Habitat degradation associated with open-cut watercourse crossings has the potential to result in a short-term, likely significant negative effect, at a local geographic scale.

8.5.1.1.3 *Habitat Degradation as a Result of Hydrological Impacts*

533. Changes to the natural flow regime in the aquatic system in terms of changes to the water balance, flow depth, velocities, temperature, and density, 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).

534. 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/riverbed and bank morphology with the potential to alter erosion and deposition rates locally and downstream. The Proposed Project's drainage provides a potential direct pathway for contaminants from accidental spillages. Activities within or close to the watercourse channels can also lead to increased turbidity through re-suspension of bed sediments and release of new sediments from earthworks. Consequently, the Proposed Project's drainage and in-stream works can potentially represent a severe disruption to aquatic ecology.
535. The contaminants that may arise from construction runoff are as follows:
- Elevated silt/sediment loading in construction site runoff. Elevated silt loading can lead to long-term damage to aquatic ecosystems by smothering spawning grounds and clogging the gills of fish. Increased silt load in the receiving watercourse stunts aquatic plant growth, limits dissolved oxygen capacity and reduces overall ecological quality, most critically during 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. Cement-based products are highly alkaline (releasing fine highly alkaline silt) and extremely corrosive and can result in significant effects 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.
536. During the Construction Phase, contaminated surface water runoff and/or an accidental spillage or pollution event into any watercourse crossed by the Proposed Project has the potential to have a significant negative impact on water quality. In general, 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. For the Proposed Project, in extreme circumstances, effects on the natural flow regime and/or water quality of surface water draining to a European site(s) has the potential to result in a long-term, likely significant negative effect, at an international geographic scale.
537. During the pipeline test and commissioning sequence, hydrostatic pressure testing will be required (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 in relation to biodiversity. 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 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 8.78 and Table 8.79).

538. 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. The 49 Line Valves along the Treated Water Pipeline would have Washout Valves, of which 20 would discharge water. These 20 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 1l/s and 4l/s. These are detailed in Annex F in 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/Cartron SAC
- WO-240: No pathway to any European site
- WO-250: No pathway to any European site.

539. 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, which has the potential to result in a short-term, likely significant negative effect, on an international geographic scale (Table 8.65).

8.5.1.1.4 *Habitat Degradation as a Result of Hydrogeological Impacts*

8.5.1.1.4.1 *Infrastructure Sites (RWI&PS, WTP, BPT, BPS, FCV, and TPR), Pipe Storage Depots, and Construction Compounds*

540. Groundwater bodies were delineated based on aquifer flow regimes, geological boundaries and boundaries based on flow systems and flow lines. Ireland has delineated GWDTE GWBs that are at risk of failing to meet the environmental objectives of the WFD. The GWDTE GWBs followed the delineation rules relating to aquifer flow regimes and geological boundaries, but focused on boundaries relating to the flow systems and flow lines of the GWDTE catchment. Based on a review of the available information, there are no delineated GWDTE GWBs within the Proposed Project.

541. A hydrogeological assessment was undertaken to inform the impact assessment for the Proposed Project. The hydrogeological assessment included both a desk review and field surveys/ground investigation works. The ground investigation 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 ground investigation works) is provided in Chapter 10 (Soils, Geology and Hydrogeology).
542. 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 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, therefore there would be no likely significant effects on the biodiversity within the European sites.
543. A review of desk-based information and mapping indicated 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). There are no other European sites within 1km of the infrastructure sites, Pipe Storage Depots or Construction Compounds. Based on a review of the source-pathway-receptors, there is no potential for hydrogeological impacts associated with the RWI&PS, WTP, BPT, BPS, FCV, Pipe Storage Depots, Construction Compounds, or TPR, and thus there are no likely significant negative effects, at any geographic scale. Furthermore, 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.

8.5.1.1.4.2 Raw Water Rising Main and Treated Water Pipeline

544. A number of European sites are located downgradient of the RWRM and Treated Water Pipeline, as detailed in Section 8.3.1.1. With the exception of Lisduff Fen SAC, no GWDTEs associated with European sites are located within 1km of the RWRM and Treated Water Pipeline. Construction Phase activities 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.
545. Table 8.53 lists GWBs traversed by or potentially impacted by the pipeline. The Proposed Project is not located within any delineated GWDTE GWB. The locations of these GWBs relative to the Proposed Project and European sites are detailed further in Table 8.53.

Table 8.53: Summary of Groundwater Bodies

EU_CD Code	Name	Description	Infrastructure*	GWB status (2019-2024)
IE_SH_G_009	Ardnacrusha	Karstic	38 kV Uprate Works	Good, WFD not at risk
IE_SH_G_157	Lough Greany	Poorly productive bedrock	38 kV Uprate Works	Good, WFD not at risk
IE_SH_G_257	O'Briensbridge Gravels	Gravels	38 kV Uprate Works	Good, WFD not at risk
IE_SH_G_213	Slieve Phelim	Poorly productive bedrock	38 kV Uprate Works	Good, WFD not at risk
IE_SH_G_178	Nenagh	Poorly productive bedrock	38 kV Uprate 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, WFD not at risk
IE_SH_G_248	Silvermines	Poorly productive bedrock	Treated Water Pipeline from the WTP to the BPT (TW – 6100)	Poor, not at risk
IE_SH_G_250	Silvermines Gravels	Gravel	38 kV Uprate Works, RWRMs, Treated Water Pipeline from the WTP to the BPT	Good, WFD not at risk
IE_SH_G_147	Lismaline	Productive fissured bedrock	CC2 and Treated Water Pipeline from the WTP to the BPT	Good, WFD not at risk
IE_SH_G_205	Shinrone	Poorly productive bedrock	PSD2, PSD3, BPS (incl. CC4), Treated Water Pipeline from the WTP to the BPT and Treated Water Pipeline from the BPT to the TPR	Good, WFD not at risk
IE_SH_G_103	Geashill	Poorly productive bedrock	CC4, PSD5, PSD6 and Treated Water Pipeline from the BPT to the TPR	Good, WFD not at risk
IE_SE_G_107	Portlaoise	Poorly productive bedrock	Treated Water Pipeline from the BPT to the TPR	Good, WFD not at risk
IE_SE_G_116	Rhode	Productive fissured bedrock	PSD8, Treated Water Pipeline from the BPT to the TPR	Good, WFD not at risk
IE_SE_G_048	Cushina	Poorly productive bedrock	PSD6, Treated Water Pipeline from the BPT to the TPR	Good, WFD not at risk
IE_SE_G_153	Bagenalstown Upper	Karstic	Treated Water Pipeline from the BPT to the TPR	Good, WFD not at risk
IE_SE_G_077	Kildare	Poorly productive bedrock	CC6, FCV and Treated Water Pipeline from the BPT to the TPR	Good, WFD not at risk
IE_EA_G_002	Trim	Productive fissured bedrock	Treated Water Pipeline from the BPT to the TPR	Good, at risk
IE_EA_G_008	Dublin	Poorly productive bedrock	PSD9, PSD10, Treated Water Pipeline from the BPT to the TPR, TPR (incl. CC7)	Good, WFD risk under review

Note: * CC = Construction Compound; ** PSD = Pipe Storage Depot

546. 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.
547. The main sources of pressure on GWDTEs are abstraction/drainage and nutrient inputs.
548. The nearest SAC with groundwater dependent qualifying interests is Lisduff Fen (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 scrub, and some vegetation more akin to that of raised bog, with species such as ling 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) (DAHG 2013b).
549. Geyer's whorl snail 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's 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 (Moorkens and Killeen 2011).
550. As stated in the conservation objectives document for the SAC (Department of Culture, Heritage and the Gaeltacht (DCHG) 2019), '*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.)*'.
551. A petrifying spring is located in the western fen area at the toeslope of a large limestone ridge (DCHG 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 Proposed Project is located, does not provide groundwater flow to the fen area. 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.
552. 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.

553. 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 and 38 kV Uprate Works. 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, there is no potential for hydrogeological impacts on the qualifying interests in the fen area, or other areas of Lisduff Fen SAC.
554. Sharavogue Bog SAC is situated between the Little Brosna_040 river (SC: 25_13147) and an elevated ridge of Carboniferous limestone, approximately 3.2km from the Proposed Project. 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 qualifying interests include Raised Bog (Active), Degraded Raised Bog and Rhynchosporion vegetation (DAHG 2017). 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. 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 (650 microsiemens per 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. On this basis there is no potential for direct or indirect hydrogeological impacts on Sharavogue Bog SAC as a result of the Proposed Project.
555. 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.

Groundwater Levels

556. 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 reinstatement of the Proposed Project.
557. 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 scrub, and some vegetation 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 fast-flowing stream which flows into the fen at the south end is 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.

558. 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. Thus, it is considered there is potential for a short-term likely significant negative effect, at an international geographic scale.
559. Given the long distance to the remaining SACs (>1km), and the short-term Construction Phase there are no likely significant effects from alterations in groundwater levels on any other European site. Similarly, during the Operational Phase there are no likely significant effects on any other European site from alterations in groundwater levels.

Groundwater Quality

560. During the Construction Phase there is a risk of groundwater pollution from accidental (small scale 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.
561. 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. 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 would be compliant with the Groundwater Directive 2006/118/EC and Drinking Water Directive 2020/2184). During commissioning, any discharges would 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 impacts during the Construction Phase on groundwater supply or quality in relation to European sites and associated groundwater dependent habitat/species, and thus there are no likely significant negative effects, at any geographic scale.

38 kV Uprate Works

562. Only minimal earthworks would be carried out during the Construction Phase of the 38 kV Uprate Works, such as the replacement of polesets. Therefore, there would be no potential for groundwater supply or quality impacts on European sites and associated groundwater dependent habitat/species, and thus there are no likely significant negative effects, at any geographic scale.

8.5.1.1.5 Habitat Degradation as a Result of Air Quality Impacts

563. 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, NO₃), volatile organic compounds (VOCs), PM, heavy metals, and ammonia (NH₄) within the Zol 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 Zol was limited to sensitive ecological habitats that are within 50m of the Proposed Project, in line with the IAQM (2024) guidelines. The Zol 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).

564. Air quality modelling of traffic emissions (nitrogen oxides (NO_x), ammonia (NH₃), nutrient nitrogen deposition, which is nitrogen dioxide (NO₂) and NH₃ and acidity) due to the proposed increased volume of traffic on Haul Roads during the Construction Phase of the Proposed Project, was carried out as per TII (2022). 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 (Chapter 12: Air Quality)). The modelling focused on roads where there is a greater than 1,000 Annual Average Daily Traffic (AADT) change or greater than 200 heavy duty vehicles (HDV) AADT change. From this it was concluded that two European sites, the River Barrow and River Nore SAC, at Mountmellick and Portarlinton in County Laois and the Lower River Shannon SAC at Birdhill in County Tipperary, required modelling of traffic emissions. The worst-case modelling results predict NH₃, nitrogen deposition, and acid deposition will 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.
565. The River Barrow and River Nore SAC is designated for ten Annex I habitats. From an assessment of the site conservation objectives document and available Article 17 NPWS data, there is only 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. water courses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-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]).
566. Habitats surveys were therefore undertaken at Mountmellick (ITM coordinates: E 645448, N 707409) and at Portarlinton (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 Portarlinton 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 NO_x concentration (including background emissions plus additional emissions associated with the Proposed Project traffic) at the closest point (i.e. 0m) to the River Barrow and River Nore SAC was modelled as 10.56µg/m³ at Mountmellick and 10.6µg/m³ at Portarlinton. The NO_x limit value is 30µg/m³, 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, NO_x levels will not result in a likely significant negative effect, at any geographic scale
 - The total annual mean NH₃ 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/m³ at Mountmellick and 3.92µg/m³ at Portarlinton (with a critical load of 1µg/m³ for NH₃). However, the high concentrations are primarily due to the high background concentrations which are already in exceedance of 1µg/m³. The Proposed Project will increase NH₃ concentrations within the relevant section of the River Barrow and River Nore SAC at Mountmellick by 0.14µg/m³ and at Portarlinton by 0.14µg/m³. Furthermore, considering no

qualifying interest habitats were recorded within a 200m radius of either Proposed Project Haul Road crossings, there is no potential for impacts from NH_3 levels, and thus there are no likely significant negative effects, at any geographic scale

- The total annual mean nitrogen (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 Portarlinton. 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 two Proposed Project Haul Road crossings, there is no potential for impacts from N deposition levels, and thus there are no likely significant negative effects, at any geographical scale
- 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 Portarlinton. Considering no qualifying interest habitats were recorded within a 200m radius of either Proposed Project Haul Road crossings, there is no potential for impacts from acid deposition, and thus there are no likely significant negative effects, at any geographic scale.

567. The Lower River Shannon SAC is designated for 14 Annex I habitats. From an assessment of the site conservation objectives document 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]).

568. 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 NO_x 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 4.4 $\mu\text{g}/\text{m}^3$. As noted, the NO_x limit value is 30 $\mu\text{g}/\text{m}^3$. 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 significant impacts from NO_x levels, and thus there are no likely significant negative effects, at any geographical scale
- 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 2.55 $\mu\text{g}/\text{m}^3$, which is above the critical load of 1 $\mu\text{g}/\text{m}^3$. However, the high concentrations are primarily due to the high background concentrations which are already in exceedance of 1 $\mu\text{g}/\text{m}^3$. The Proposed Project will increase NH_3 concentrations within the relevant section of the Lower River Shannon SAC at Birdhill by 0.07 $\mu\text{g}/\text{m}^3$. 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 NH_3 levels, and thus there are no likely significant negative effects, at any geographic scale
- The total annual mean nitrogen (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 significant impacts from N deposition levels, and thus there are no likely significant negative effects, at any geographical scale

- 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 there are no likely significant negative effects, at any geographic scale.

569. Dust emissions associated with construction works could, in extreme circumstances, affect adjoining habitats (potentially burying sensitive habitat or plant species). The Zol for dust impacts was limited to sensitive ecological habitats that are within 50m of the Proposed Project, in line with the IAQM Guidance on the Assessment of Dust from Demolition and Construction (IAQM 2024). Thus, the potential for air quality impacts arises only for the Lower River Shannon SAC, as all other European sites are greater than 50m away and are therefore beyond the Zol. These impacts have the potential to result in temporary, likely significant negative effects on plant species composition, diversity or abundance of this SAC, at an international geographic scale.

8.5.1.1.6 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species and Pathogens

570. Invasive non-native species have been recorded within or in close proximity to the Proposed Project (Section 8.3.2.1.2 and Section 8.3.3.9). Therefore, construction works have the potential to accidentally cause their introduction/spread to areas within European sites downstream of the Proposed Project. This has the potential to have long-term, likely significant negative effects, on species composition, diversity, and abundance at these European sites (Table 8.23, refer also to Table 6.1 in the NIS), at the international geographic scale.

571. In addition, the discharge of water to local watercourses from Washout Valves during drain-down events following the completion of hydrostatic pressure testing and discharge of sweetening flows during final filling in the Commissioning Phase (see Section 8.5.1.1.3) also has the potential to spread INNS to downstream European sites within the Zol. Without appropriate mitigation measures in place, there is a potential for short-term, likely significant negative effects, at the international geographic scale (Table 8.65).

8.5.1.1.7 Disturbance/Displacement

572. 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.

573. 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. These impacts have the potential to result in temporary, likely significant negative effects, at an international geographic scale. Freshwater pearl mussel and common bottlenose dolphin are also qualifying interest species of the Lower River Shannon

SAC, however given the nature of the Proposed Project, potential pathways of risk are not considered to exist.

574. With regard to the 38 kV Uprate Works, no in-stream works are proposed and buffer zones (minimum of 10m) would be maintained between the 38 kV Uprate Works and watercourses reducing the potential for direct disturbance to any qualifying interest species or their breeding/resting sites. Furthermore, no signs of otter or otter breeding or resting sites were recorded during the ecological field surveys. Therefore, there are no likely significant negative effects, at any geographic scale.
575. Disturbance/displacement effects from the Proposed Project along the route of the pipeline may affect the qualifying interest species of a SAC site that is crossed by, or in close proximity to, or downstream of the site. The same applies in relation to SPA sites with the additional requirement to consider sites beyond the SPA boundary that are important in supporting the special conservation interest population(s) of the SPA. During the Construction Phase, disturbance/displacement impacts along the route of the pipeline have the potential for temporary, likely significant negative effects, on qualifying interest/special conservation interest species of European sites within the Zol of the Proposed Project (Table 8.23, refer also to Table 6.1 in the NIS), at an international geographic scale.

8.5.1.1.8 *Mortality Risk*

576. 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.
577. During construction of the RWI&PS, there is a minor risk of construction materials accidentally 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. 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. These impacts have the potential to result in short-term, likely significant negative effects, at the local geographic scale.
578. No in-stream 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 open-cut watercourse crossings (Appendix A8.14: Watercourse Crossing Data), there is potential for aquatic qualifying interest species to occur at 32 crossings which are upstream of four European sites (Table 8.54, refer also to Table 5.6 of the NIS), and therefore there is potential for mortality of these species during the Construction Phase. However, in the case of open-cut crossings, watercourses would be dammed and fish and white-clawed crayfish would be temporarily removed using electrofishing equipment and trapping 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. These impacts have the potential to result in permanent, likely significant negative effects, at the local geographic scale. In the case of trenchless crossings, the launch and reception shafts would be situated outside of the riparian zone, therefore buffer strips of natural uncleared vegetation would be preserved between construction activity and all rivers, streams and water bodies being crossed, which would also benefit otter by maintaining bankside habitat continuity. 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; thus, there are no likely significant negative effects, at any geographic scale.

8.5.1.1.9 *Barrier Effect*

579. The Proposed Project could potentially pose a physical barrier to aquatic species movement as a result of physical construction.
580. 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, in particular during migratory periods) 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).
581. 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.
582. None of the watercourse crossings are within the boundaries of a European site (no direct effects), with the exception of WCX077 which is located within the boundaries of the Lower River Shannon SAC, along the route of the power supply to the RWI&PS on the R494 road. This watercourse crossing will be crossed by horizontal directional drilling trenchless methods. The trenchless crossing would be approximately 20m in length and the level of the ducting would be 1.0m below the invert level of the river at the crossing point. Any other potential barrier effects as a result of the Proposed Project are indirect (i.e. not within the boundaries of a European site). Physical barriers associated with open-cut and trenchless techniques have the potential to result in temporary, likely significant negative effects, at the local geographic scale.

8.5.1.2 *Natural Heritage Areas and Proposed Natural Heritage Areas*

583. As mentioned in Section 8.3.1.2, there are 24 NHAs and 102 pNHAs within 15km of the Proposed Project (Table 8.24). Many of these overlap with a European site and are therefore considered under European sites as the features of interest of the NHAs/pNHAs are the same as the qualifying interests of the European sites (Section 8.5.1.1). Of the 16 NHAs and 60 pNHAs that do not overlap with a European site, 11 were found to have a source-pathway-receptor with the Proposed Project. These include: Screggan Bog NHA, Annaghmore Lough Fen (Offaly) pNHA, Willsborough Esker pNHA, Cloonlara House pNHA, Birr (Domestic Dwelling No. 1, Occupied) pNHA, Birr (Domestic Dwelling No. 2, Occupied) pNHA, Kinnitty (Domestic Dwelling, Occupied) pNHA, Bracken's Dwelling, Near Whiteford pNHA, Clonad Wood pNHA, Mount St. Joseph Woods pNHA and Miltown, Shinrone pNHA (Table 8.24).

8.5.1.2.1 *Habitat Degradation as a Result of Hydrological and Hydrogeological Impacts*

584. As the Proposed Project does not overlap with any of the 11 NHA/pNHA sites with a source-pathway-receptor with the Proposed Project, they would not be directly impacted. However, there is a potential for indirect effects associated with Construction Phase impacts such as the risk of affecting water quality 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. Long-term dewatering can also result in effects on GWDTE. There are no GWDTEs with 1km of the RWI&PS, WTP, BPT, BPS, FCV, PSDs, Construction Compounds or TPR.

585. The Proposed Project has the potential to cause a temporary impact on localised 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 reinstatement of the pipeline. There are no pNHA/NHA GWDTEs within the Zol of the pipeline and no significant pathways that would be impacted by the proposed works, with the exception of Annaghmore Lough Fen pNHA. All that remains of Annaghmore Lough Fen pNHA itself is a small remnant pool, barely 2ha and only a couple of centimetres deep. The mapped boundary of Annaghmore Lough Fen pNHA includes a variety of habitats including peatland, alkaline fen, reed swamp, forestry, woodlands and hedgerows. The habitats within 0.2km of the Proposed Project are comprised of mature hedgerows. The lough/fen area was mapped as 0.8km from the Proposed Project. Based on site walkovers and aerial mapping, this fen area has been altered by agricultural drainage, forestry and land improvement. Due to the distance to the fen area, it is considered potential impacts associated with temporary changes to groundwater levels would have no likely significant effects on Annaghmore Lough Fen pNHA.
586. Surface water runoff and groundwater discharged during the construction of the Treated Water Pipeline could cause negative effects on habitats within NHA/pNHA sites. Potential impacts relate to hydrological/hydrogeological connectivity downgradient of the Proposed Project. In the absence of appropriate mitigation, surface water quality impacts as a result of the construction of the Proposed Project, on Screggan Bog NHA (>3km), Annaghmore Lough Fen (Offaly) pNHA (0.8km), Willsborough Esker pNHA (0.7km), Clonad Wood pNHA (2km) and Mount St. Joseph Woods pNHA (5km) have the potential to result in temporary, likely significant negative effects, at a national geographic scale.

8.5.1.2.2 Disturbance/Displacement

587. Six pNHAs located within 15km of the Proposed Project are protected for bat roosts and were found to have a potential impact pathway with the Proposed Project (Table 8.24). All six sites are located beyond the Zol of the Proposed Project for direct impacts from light spill, noise and/or disturbance and thus there is no potential for these impacts to negatively affect these bat roost sites. Therefore, potential loss of key foraging and commuting habitat is the only impact that has the potential to have a significant indirect effect on the bat populations of these pNHAs, and is therefore the main consideration to be assessed, as follows:
- Leisler's bat frequently forage over 5km from their roost site (Kelleher and Marnell 2006) and preferentially forage over open areas such as grasslands and parklands as well as over lakes, rivers, canals and deciduous woodland edges (Carden *et al.* 2010). More recently, BCT have defined CSZs for different bat species and identified a radius of 3km from roost sites for Leisler's bat (Collins 2023) and this is set as the Zol for indirect impacts for this bat species. Artificial street lighting and floodlights may also present in important foraging sites (Carden *et al.* 2010). The Proposed Project crosses a number of grasslands, watercourses, and woodlands which may offer potential foraging habitat for the Leisler's bat populations of the following pNHA sites: Cloonlara House, Birr (Domestic Dwelling No. 1 Occupied), Birr (Domestic Dwelling No. 2 Occupied), Kinnitty (Domestic Dwelling, Occupied), and Bracken's Dwelling Near Whiteford. These sites are located on the outskirts of Birr, County Offaly but within the Zol for this bat species. However, the habitats surrounding these roosts (such as the Camcor River and Little Brosna River, as well as the intervening agricultural land between the sites and the Proposed Project) offer an abundance of alternative suitable foraging habitat locally which is likely to be sufficient to maintain the local populations of Leisler's bat in the long-term. It is therefore predicted that despite any temporary effects, the loss of foraging habitat associated with the Proposed Project is unlikely to affect the conservation status of the local bat population and thus there are no likely significant negative effects on the Cloonlara House, Birr (Domestic Dwelling No. 1 Occupied), Birr (Domestic Dwelling No. 2 Occupied), Kinnitty (Domestic Dwelling, Occupied), and Bracken's Dwelling Near Whiteford pNHAs, at any geographic scale

- Natterer's bat occasionally forage up to 6km from their roost but prefer to forage in broadleaved and riparian woodland habitats (Smith and Racey 2008). The CSZ identified for Natterer's bat is a 4km radius from a communal roost (Collins 2023) and therefore is set as the ZoI for this species of bat. The Proposed Project is located 3.8km north and within the ZoI of a Natterer's roost site at Miltown, Shinrone, County Offaly. The area around the Miltown, Shinrone roost offers alternative suitable foraging habitat along the Black River and Little Brosna River, as well as additional woodland habitats in the intervening lands between the roost and the Proposed Project. The majority of the habitats recorded within the Proposed Project nearest Miltown, Shinrone (Figure 8.36 and Figure 8.37) were made up of grassland habitats, hedgerows and treelines and offer an abundance of alternative suitable foraging habitat locally which is likely to be sufficient to maintain the local populations of Natterer's bat in the long-term. It is therefore predicted that, despite any temporary effects, the loss of foraging habitat associated with the Proposed Project is unlikely to affect the conservation status of the local bat population and thus, there are no likely significant negative effects, at any geographic scale.

8.5.1.2.3 *Habitat Degradation as a Result of Air Quality Impacts*

588. Air quality modelling of traffic emissions (NO_x, NH₃, nutrient nitrogen deposition and acidity) due to the proposed increased volume on Haul Roads during the Construction Phase of the Proposed Project was carried out as per TII (2022). As noted in Section 8.5.1.1, the modelling focused on roads where there is greater than a 1,000 AADT change or greater than 200 HDV AADT change (Chapter 12: Air Quality). From this it was concluded that two nationally designated sites, Grand Canal pNHA, at the Killina, County Kildare crossing and Kilcormac Esker pNHA at Blueball, County Offaly required modelling of traffic emissions. The worst-case modelling results predict in the Do-Something scenario, NH₃, nitrogen deposition, and acid deposition were in exceedance of critical loads at the Grand Canal pNHA, while acid deposition only was in exceedance at the Kilcormac Esker pNHA. The background concentrations of these pollutants at both sites are already close to or in exceedance of the critical loads.
589. The Grand Canal pNHA is adjacent to the proposed Haul Road along the L5026-3 local road in Killina, County Kildare. Habitat surveys were undertaken at the site (ITM coordinates: E 671319, N 729367), which required modelling of traffic emissions.
590. This pNHA is a man-made waterway linking the River Liffey at Dublin with the River Shannon and the River Barrow. During surveys, habitats recorded within the pNHA and within a 200m radius of the proposed Haul Road included the canal, amenity and improved agricultural grassland, buildings and artificial surfaces and treelines. No designated or ecologically sensitive habitats/vegetation were recorded.
- The total annual mean NO_x concentration (including background emissions plus additional emissions associated with the Proposed Project traffic) at the closest point (i.e. 0m) to the Grand Canal pNHA was modelled as 5.18µg/m³. The NO_x limit value is 30µg/m³, which is based the Air Quality Regulations. Therefore, considering the low predicted concentrations, coupled with the absence of any designated or ecologically sensitive habitats within the ZoI, there is no potential for impacts from NO_x levels on the pNHA and therefore there are no likely significant negative effects, at any geographic scale
 - The total annual mean NH₃ concentration (including background emissions plus additional emissions associated with the Proposed Project traffic) was calculated as 3.17µg/m³. Of this, the Proposed Project is predicted to contribute 0.07µg/m³ at the Grand Canal pNHA. The NH₃ critical level is 1µg/m³ to 3µg/m³ (annual, long-term, critical levels have been set to 1µg/m³ for lichens and bryophytes, and 3µg/m³ for higher plants), based on the Air Quality Regulations. Background concentrations of NH₃ in the affected area of the Grand Canal pNHA are already in exceedance of the annual long-term limit value. There is potential for impacts on vegetation to arise within the pNHA due to elevated NH₃ concentrations. The impacts would be confined to a 200m buffer surrounding the crossing points of the Haul Road on the R402. There are, however, no designated or ecological sensitive habitats/vegetation (including rare or protected bryophytes or higher plants)

located within the pNHA at the crossing or within a 200m buffer of the crossing. There is no potential for impacts from NH_3 levels on the pNHA associated with the proposed Haul Road, and therefore there are no likely significant negative effects, at any geographic scale

- The total annual mean N deposition (including background emissions plus additional emissions associated with the Proposed Project traffic) was calculated as 10.27kgN/ha/yr. The critical load (lower limit) for N deposition is 5kgN/ha/yr. There is potential for impacts on vegetation to arise within the pNHA due to elevated N deposition. The impacts would be confined to a 200m buffer surrounding the Haul Road on the L5026-3. Potential impacts include change in soil processes and nutrient imbalances. If hedgerow/treeline species support lichens as epiphytes, which are sensitive to N deposition, a reduction/loss/alteration of such species may arise (reduction in species richness, loss of characteristic moss/lichen species, increased growth of woodland species where soil layer carbon nitrogen (C:N) ratio is high (APIS 2025)). There are, however, no designated or ecological sensitive habitats located within a 200m buffer of the pNHA adjacent to the Haul Road. There is no potential for impacts from N deposition on the pNHA, and therefore there are no likely significant negative effects, at any geographic scale
- The total annual mean acid deposition (including background emissions plus additional emissions associated with the Proposed Project traffic) was calculated as 0.89keq/ha/yr. The critical load (lower limit) for acid deposition is 0.714keq/ha/yr. No specific critical load values for calcareous grasslands are defined, but acid deposition is considered a minor threat due to the neutralising capacity of this habitat (i.e. base-rich calcareous grasslands are resistant to acid deposition, due to a high weathering potential) (APIS 2025). There is potential for impacts to arise on vegetation within the pNHA due to elevated acid deposition. The impacts would be confined to a 200m buffer surrounding the Haul Road on the L5026-3. Potential impacts include changes to epiphytic species (primarily that of moss and lichens), species composition of ground flora, visible decline symptoms (e.g. branch dieback, reduced crown density, leaf discoloration) and nutrient imbalance (APIS 2025). There are, however, no designated or ecological sensitive habitats, including calcareous grasslands, located within a 200m buffer of the pNHA at the proposed Haul Road. There is no potential for impacts from acid deposition on the pNHA, and therefore there are no likely significant negative effects, at any geographic scale.

591. The Kilcormac Esker pNHA is adjacent to the proposed Haul Road along the N52 national road in Blueball, County Offaly. Habitat surveys were undertaken at the site (ITM coordinates: E 624275, N 718927), which required modelling of traffic emissions.

592. This pNHA is an esker ridge of glacial till with calcium-rich soils. During surveys, habitats recorded within a 200m radius of the pNHA adjacent to the proposed Haul Road included a mosaic of mixed broadleaved woodland with an abundance of beech, oak-birch-holly woodland, and oak-ash-hazel woodland, as well as improved agricultural grassland and hedgerows. The habitat did not confirm to Annex I habitat and no designated or ecologically sensitive habitats/vegetation were recorded.

- The total annual mean NO_x concentration (including background emissions plus additional emissions associated with the Proposed Project traffic) at the closest point (i.e. 0m) to the Kilcormac Esker pNHA was modelled as 3.25 $\mu\text{g}/\text{m}^3$. The NO_x limit value is 30 $\mu\text{g}/\text{m}^3$, which is based the Air Quality Regulations. Therefore, considering the low predicted concentrations, coupled with the absence of any designated or ecologically sensitive habitats within the ZoI, there is no potential for impacts from NO_x levels on the pNHA and thus, there are no likely significant negative effects, at any geographic scale
- The total annual mean NH_3 concentration (including background emissions plus additional emissions associated with the Proposed Project traffic) was calculated as 2.55 $\mu\text{g}/\text{m}^3$. Of this, the Proposed Project is predicted to contribute 0 $\mu\text{g}/\text{m}^3$ at the Kilcormac Esker pNHA. The background concentration of NH_3 in the affected area of the Kilcormac Esker pNHA is already in exceedance of the annual, long-term, critical level for lichens and bryophytes (1 $\mu\text{g}/\text{m}^3$), but does not exceed the limit for higher plants (3 $\mu\text{g}/\text{m}^3$). As the Proposed Project would not contribute to the background concentration, there is no potential for impacts on vegetation to arise within the pNHA due to NH_3 concentrations associated with the Proposed Project. Furthermore, no designated or ecological

sensitive habitats/vegetation (including rare or protected bryophytes or higher plants) were recorded within a 200m buffer of the pNHA at the proposed Haul Road location. There is no potential for impacts on the pNHA from NH_3 levels associated with the proposed Haul Road, and therefore there are no likely significant negative effects, at any geographic scale

- The total annual mean N deposition (including background emissions plus additional emissions associated with the Proposed Project traffic) was calculated as 7.68kgN/ha/yr. The critical load (lower limit) for N deposition is 10kgN/ha/yr. Of this, the Proposed Project is predicted to contribute 0kgN/ha/yr at the Kilcormac Esker pNHA. The background concentration of N deposition in the affected area of the Kilcormac Esker pNHA is already in exceedance of the critical load. As the Proposed Project would not contribute to the background concentration, there is no potential for impacts on vegetation to arise within the pNHA due to N deposition concentrations associated with the Proposed Project. Furthermore, no designated or ecological sensitive habitats/vegetation (including rare or protected bryophytes or higher plants) were recorded within a 200m buffer of the pNHA at the proposed Haul Road location. There is no potential for impacts on the pNHA from N deposition levels associated with the proposed Haul Road, and therefore there are no likely significant negative effects, at any geographic scale
- The total annual mean acid deposition (including background emissions plus additional emissions associated with the Proposed Project traffic) was calculated as 0.52keq/ha/yr. The critical load (lower limit) for acid deposition is 0.286keq/ha/yr. The Proposed Project is predicted to contribute 0keq/ha/yr at the Kilcormac Esker pNHA. The background concentration of acid deposition in the affected area of the Kilcormac Esker pNHA is already in exceedance of the critical load (lower limit). As the Proposed Project would not contribute to the background concentration, there is no potential for impacts on vegetation to arise within the pNHA due to acid deposition concentrations associated with the Proposed Project. Furthermore, no designated or ecological sensitive habitats/vegetation (including rare or protected bryophytes or higher plants) were recorded within a 200m buffer of the pNHA at the proposed Haul Road location. There is no potential for impacts on the pNHA from acid deposition levels associated with the proposed Haul Road, and therefore there are no likely significant negative effects, at any geographic scale.

593. As noted, dust emissions associated with construction works could, in extreme circumstances, affect adjoining habitats (potentially burying sensitive habitat or plant species). The ZOI was limited to sensitive ecological habitats that are within 50m of the Proposed Project, in line with the IAQM guidance (IAQM 2024). Thus, the potential for air quality impacts arises only for the Grand Canal pNHA and the Annaghmore Lough Fen (Offaly) pNHA, as all other national sites are greater than 50m away and are therefore beyond the ZOI. These impacts have the potential to result in temporary, likely significant negative effects on plant species composition, diversity or abundance of these pNHAs, at a national geographic scale.

8.5.1.3 Ramsar Sites

594. The footprint of the Proposed Project does not overlap with any Ramsar site. There are four Ramsar sites within 15km of the Proposed Project (Ramsar 2022). These include Raheenmore Bog, Slieve Bloom Mountains, Pollardstown Fen, and Clara Bog.

595. Raheenmore Bog (Ramsar Site no. 417) is located north-east of Daingean, County Offaly, 8.5km north-east of the Proposed Project. This site is a good example of a midland raised bog, located in a small basin on the catchment divide between two major river systems. Raheenmore Bog is upstream of the Proposed Project and 5km from the Raheenmore GWDTE catchment (IE_EA_G_074). The Raheenmore Raised Bog is located on a catchment divide between the Shannon and the Boyne. To the south and west, Raheenmore Bog is drained by Puttaghan 25 Stream (EPA Segment Code 25_191), which flows south-west towards the Silver (Tullamore) River (EPA Segment Code 25_3529). This Ramsar site is located 8km upgradient of the Proposed Project and is therefore not hydrologically connected to the Proposed Project. Furthermore, Raheenmore Bog is at too great a distance from the Proposed Project (including the proposed Haul Roads; the closest is >4km away) to be indirectly affected by impacts such as noise, dust or increased human presence during the Construction Phase. There is no source-pathway-receptor between Raheenmore Bog Ramsar Site and the Proposed Project; therefore, this site is beyond the Zol and would not be directly or indirectly impacted by the Proposed Project.
596. The Slieve Bloom Mountains (Ramsar Site no. 335) are located between Kinnitty and Mountrath in County Laois, approximately 8.3km south of the section of the Proposed Project shown in Figure 8.3 to the boundary of the Ramsar Site. Features include areas of well-developed hummock, hollow and pool systems. Vegetation consists of a dwarf shrub and herb layer and extensive cover of Sphagnum moss. The Slieve Bloom Mountains are an elevated Ramsar site, 500m+ above sea level and are upgradient of the Proposed Project. Furthermore, the Slieve Bloom Mountains Ramsar Site is at too great a distance from the Proposed Project (including the proposed Haul Roads; the closest is >4km away) to be influenced by impacts such as noise, dust or increased human presence during the Construction Phase. The Slieve Bloom Mountains blanket bog is ombrotrophic and is 5km upgradient of the Proposed Project and therefore would not be impacted by groundwater links to the Proposed Project. There is no source-pathway-receptor between Slieve Bloom Mountains Ramsar Site and the Proposed Project; therefore, this site is beyond the Zol and would not be directly or indirectly impacted by the Proposed Project.
597. Pollardstown Fen (Ramsar Site no. 474) is located just north of Newbridge, County Kildare, approximately 12.6km south of the section of the Proposed Project shown in Figure 8.3. This site is the largest remaining spring-fed fen in Ireland. Habitats include semi-natural fen, damp grassland, woodland, and open water. The open water attracts water birds in regionally important numbers. The fen supports an important assemblage of invertebrate fauna and contains a complete palaeoecological record dating back to the last glaciation. Pollardstown Fen is drained by the Cloncumber Stream (EPA Segment Code 14_1870), which flows in a northerly direction towards the Slate River (EPA Segment Code 14_1839). At its closest point to Pollardstown Fen, the Proposed Project is drained by the Killinagh Upper Stream (EPA Segment Code 14_587), which flows south towards the Slate River. This site is therefore not hydrologically connected to the Proposed Project. Pollardstown Fen is also at too great a distance from the Proposed Project (including the proposed Haul Roads; the closest is >2km away) to be influenced by impacts such as noise, dust or increased human presence during the Construction Phase. The Proposed Project is located >12km from the Pollardstown Fen GWDTE and therefore would not be impacted by groundwater links to the Proposed Project. There is no source-pathway-receptor between Pollardstown Fen Ramsar Site and the Proposed Project; therefore, this site is beyond the Zol and would not be directly or indirectly impacted by the Proposed Project.
598. Clara Bog (Ramsar Site no. 415) is located between Tullamore and Clara, in County Offaly, 14.5km north of the section of the Proposed Project shown in Figure 8.3. The site is one of the largest raised bogs left in Ireland and consists of hummocks, hollows, pools and Sphagnum lawns. The site is unique in the degree of development and varieties of the soak systems present. Soak systems are now almost extinct due to peat extraction. The site is important for several nationally rare mosses and invertebrates. The closest water body to Clara Bog is the Doory 25 Stream (EPA Segment Code 25_3098), which flows south towards the Silver River [Tullamore] (EPA Segment Code 25_2950). At its closest point to Clara Bog, the Proposed Project is drained by the Clodiagh (Tullamore) (EPA Segment Code 25_13226), which flows north-west towards the Brosna River (EPA Segment Code 25_604).

599. This site is therefore not hydrologically connected to the Proposed Project. Clara Bog is at too great a distance from the Proposed Project (including the proposed Haul Roads; the closest is approximately 5km away) to be influenced by impacts such as noise, dust or increased human presence during the Construction Phase. There is no source-pathway-receptor between Clara Bog Ramsar Site and the Proposed Project; therefore, this site is beyond the Zol and would not be directly or indirectly impacted by the Proposed Project.

8.5.1.4 Nature Reserves

600. The footprint of the Proposed Project does not overlap with any Nature Reserve (NPWS 2018a). Five Nature Reserves occur within 15km of the Proposed Project. Of these five, four are also designated as Ramsar sites and are therefore discussed in Section 8.5.1.3.
601. The fifth Nature Reserve, Fiddown Island, is located south of Birr, County Offaly, 3.5km south-west of the section of the Proposed Project shown in Figure 8.3 and 1.8km from the closest proposed Haul Road. Fiddown Island is an alluvial woodland dominated by willow trees formerly used for basket making. The vegetation is characterised by tall herbs, sedges and grasses. It is covered in willow scrub and bordered by reed swamps and is the only known alluvial woodland of this type in Ireland. Fiddown Island is located on the western banks of the Little Brosna River (EPA Segment Code 25_635). At its closest point, the Proposed Project is drained by the North Kilcolman Stream (EPA Code 25_3342), which joins the Little Brosna River north of, and downstream of Fiddown Island. This site is therefore not hydrologically connected to the Proposed Project. Fiddown Island is at too great a distance from the Proposed Project to be influenced by impacts such as noise, dust or increased human presence during the Construction Phase. The Little Brosna River separates Fiddown Island from the Proposed Project, therefore Fiddown Island is unlikely to be impacted by groundwater links to the Proposed Project, should they exist.

8.5.1.5 Designated Areas of Nature Conservation – Summary of Effects During Construction

602. Table 8.54 summarises the potential Construction Phase impacts and associated effects on designated areas for nature conservation. In the absence of mitigation measures, there is potential for significant effects to nine SACs, ten SPAs, one NHA, and five pNHAs.

Table 8.54: Summary of Pre-Mitigation Effects Upon Designated Areas of Nature Conservation During Construction of the Proposed Project

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
European sites	International	Lower River Shannon SAC	Habitat loss and fragmentation	- No direct impact on Annex I qualifying interest habitats or habitats that support qualifying interest habitats 1.38ha of habitat loss within the boundaries of the Lower River Shannon SAC at the RWI&PS site (0.6ha of which is aquatic habitat (temporary loss) and 0.78ha of which is terrestrial habitat (permanent loss)) - A maximum temporary ground disturbance or working area of 0.28ha will occur within the immediate vicinity (30m radius) of each poleset that requires work to fittings within the SAC (three existing polesets) for the 38 kV Uprate Works. In total this equates to 0.55ha of the KER habitat wet grassland (GS4) - Ground disturbance associated with the movement of machinery and personnel along Temporary Construction Roads - A reduction of supporting habitat for special conservation interest species.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (RWI&PS only) - Extent: International (RWI&PS only) geographic scale
		- 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/Carlton SAC - Charleville Wood SAC - River Boyne and River Blackwater SAC - River Shannon Callows SAC - Lough Derg (Shannon) SPA - Dovegrove Callows SPA - River Shannon and River Fergus Estuaries SPA - River Boyne and River Blackwater SPA - Middle Shannon Callows SPA	Habitat degradation as a result of excavation and tunnelling	- 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) - Risk of structural fracturing or collapse of rivers/streams where trenchless construction is required - Potential for a 'breakout' of bentonite drilling fluid where trenchless construction is required - Build up and release of silt during open-cut excavations - Accidental spills of oils or chemicals from small leaks at seals of plant machinery - Temporary ground disturbance during tracked excavation work.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Temporary to short-term - Extent: Local (open-cut) to International (excavation at RWI&PS) geographic scale
		- 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/Carlton SAC - Charleville Wood SAC - River Boyne and River Blackwater SAC - River Shannon Callows SAC - Lough Derg (Shannon) SPA - Dovegrove Callows SPA - River Shannon and River Fergus Estuaries SPA - River Boyne and River Blackwater SPA - Middle Shannon Callows SPA	Habitat degradation as a result of hydrological impacts	- Changes to the natural flow regime - Changes to the chemistry of the receiving water bodies generally arising from drainage discharges.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term - Extent: International geographic scale
		Lower River Shannon SAC	Habitat degradation as a result of hydrogeological impacts	- Short-term localised lowering of the groundwater levels by dewatering of the soils and bedrock during the Construction Phase - Risk of groundwater pollution from accidental (small scale and infrequent/rare) spillages on-site as well as from fines being transported during storm events and recharging to ground.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: International geographic scale
		Lower River Shannon SAC	Habitat degradation as a result of air quality impacts	Dust deposition arising from construction activities could locally affect the extent, diversity, and vegetation composition or structure of habitats within the Lower River Shannon SAC.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: International geographic scale
		- 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/Carlton SAC - Charleville Wood SAC - River Boyne and River Blackwater SAC - River Shannon Callows SAC - Lough Derg (Shannon) SPA - Dovegrove Callows SPA - River Shannon and River Fergus Estuaries SPA - River Boyne and River Blackwater SPA - Middle Shannon Callows SPA	Habitat degradation as a result of introducing or spreading INNS and pathogens	Construction works and hydrostatic testing have the potential to accidentally cause the introduction/spread of INNS and pathogens to areas within downstream European sites.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term - Extent: International geographic scale

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
European sites	International	- Lower River Shannon 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 - Poulaphouca Reservoir SPA	Disturbance/ displacement	Increased human presence and/or noise and vibration associated with construction works at the Lower River Shannon SAC, has the potential to displace any fauna species from both breeding/resting places and from foraging habitat. The same applies in relation to SPA sites with the additional requirement to consider sites, beyond the SPA boundary, that are important in supporting the SPAs special conservation interest population(s).	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Temporary - Extent: International geographic scale
		- Lower River Shannon SAC - River Barrow and River Nore SAC - River Boyne and River Blackwater SAC - River Shannon Callows SAC	Mortality risk from construction work and traffic	Risk of construction traffic collisions with terrestrial fauna species or construction materials accidentally falling into a water body and killing/injuring aquatic fauna.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent - Extent: Local geographic scale
			Barrier effect	- 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 movement in that catchment - During trenchless excavation, bankside works (i.e. the launch and reception shafts) may result in the severance of the bankside habitat used by otter, at least temporarily, during construction.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Temporary - Extent: Local geographic scale
Ramsar Sites	International	- Raheenmore Bog - Slieve Bloom Mountains - Pollardstown Fen - Clara Bog	Habitat degradation as a result of hydrological impacts	No source-pathway-receptor between any Ramsar site and the Proposed Project; therefore, Ramsar sites are beyond the Zol and would not be directly or indirectly impacted by the Proposed Project.	No likely significant effects
NHAs and pNHAs	National	- Scraggan Bog NHA - Annaghmore Lough Fen (Offaly) pNHA - Willsborough Esker pNHA - Clonad Wood pNHA - Mount St. Joseph Woods pNHA - Grand Canal pNHA	- Habitat degradation as a result of hydrological impacts - Habitat degradation as a result of air quality impacts	- Short-term localised lowering of the groundwater levels by dewatering of the soils and bedrock during the Construction Phase - Risk of indirectly affecting water quality 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 - Dust deposition arising from construction activities could locally affect the extent, diversity, and vegetation composition or structure of habitats within the Annaghmore Lough Fen (Offaly) pNHA and the Grand Canal pNHA.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Temporary - Extent: National geographic scale
Nature Reserves	National	- Raheenmore Bog - Slieve Bloom Mountains - Pollardstown Fen - Clara Bog - Fiddown Island	- Habitat degradation as a result of hydrological impacts - Habitat degradation as a result of hydrogeological impacts	No source-pathway-receptor between any Nature Reserves site and the Proposed Project; therefore, Nature Reserve sites are beyond the Zol and would not be directly or indirectly impacted by the Proposed Project.	No likely significant effects

8.5.2 Terrestrial Ecology

603. This section describes and assesses the potential for the Proposed Project to result in likely significant effects on terrestrial ecology during the Construction Phase, under the following headings:

- Habitats and Flora (Section 8.5.2.1)
- Mammals (Section 8.5.2.2 to Section 8.5.2.5)
 - Bats
 - Eurasian Badger
 - Otter
 - Other Mammal Species
- Invertebrates (Section 8.5.2.6)
 - Lepidoptera
 - Molluscs
- Other Species Groups (Section 8.5.2.7)
 - Reptiles and Amphibians.

8.5.2.1 Habitats and Flora

604. The results of the desktop review and field surveys found that the Proposed Project supports 65 habitat classifications, of which 33 were identified as KERs. Of these 33, 27 were terrestrial habitats and six were aquatic habitats (Table 8.28 and Table 8.52). Terrestrial habitats are considered in this section, and aquatic habitats are considered in Section 8.5.3.

605. No Annex I habitats were recorded within the Proposed Project; however, Annex I habitats were recorded within the study area (as defined in Section 8.2.2). Annex I habitats, identified through the desktop review or recorded during habitat surveys, were avoided during the route selection process (Chapter 3: Consideration of Reasonable Alternatives) (Section 8.1.1).

606. The results of the desktop review of rare and/or protected flora found that 43 FPO or Irish Red List flora species were recorded in the NBDC or BSBI datasets as occurring within the grid squares enveloping the Proposed Project. Of these 43, two flora species were recorded during fields surveys within the Zol of the Proposed Project and are considered as KERs: yellow archangel and basil thyme.

8.5.2.1.1 Habitat and Rare/Protected Flora Loss

607. The footprint of the Proposed Project comprises a mosaic of terrestrial and aquatic habitats, including agricultural grassland, scrub, woodlands, semi-natural grasslands, peatlands, arable crops and streams. Potential impacts on aquatic habitats within the Proposed Project's Zol during the Construction Phase are considered in detail in Section 8.5.3.

608. Without appropriate mitigation measures in place, the most significant loss and impact to habitats and rare/protected flora would be during the Construction Phase. Construction activities, including excavation, storage of excavated materials, vegetation clearance, Temporary Construction Roads and floating roads (within the Construction Working Width), and topsoil stripping would result in a loss of habitats and rare/protected flora within the Proposed Project areas. This would also have direct impacts on species diversity and loss of feeding habitat for local fauna populations (Section 8.5.2.2 to Section 8.5.2.5). The Zol in ecological terms extends beyond the footprint of the Proposed Project, particularly in relation to water-dependent habitats and foraging and commuting routes of protected species which vary in size.

609. During the Construction Phase, construction works associated with the Proposed Project would result in temporary terrestrial habitat and rare/protected flora loss along the length of the 38 kV Uprate Works, Treated Water Pipeline, and/or within the Construction Compounds and Pipe Storage Depots. Permanent terrestrial habitat loss would occur within the footprint of the proposed RWI&PS, WTP, BPT, BPS, FCV and TPR (including access roads), as well as areas within the 20m wide Permanent Wayleave associated with Line Valves, Air Valves, and Washout Valves, during the Construction Phase and thereafter. No rare/protected flora were recorded in these areas of permanent habitat loss. As a worst-case scenario, it is considered that all terrestrial habitats and rare/protected flora within the Proposed Project Planning Application Boundary would be either permanently or temporarily lost during the Construction Phase.
610. Vegetation trimming may be required for the 38 kV Uprate Works to enable access to each structure to complete development works or to ensure the viability of the OHL or structure is not damaged by these features. In accordance with ESNB's 'tree and vegetation trimming standard', with regard to clearance from live 38 kV OHLs, the minimum clearance required for aerial pruning of trees is 5m beneath and to the sides of conductors. Many of the conductors are located within agricultural grasslands where no vegetation trimming will be required; however, as a worst-case scenario, this would result in the trimming back of approximately 650m of treelines and hedgerows along the proposed 38 KV Uprate Works. The following trees are also removed: trees overhanging a conductor, diseased trees within falling distance, and unstable trees within falling distance. With regard to cutting back vegetation, all branches overhanging the line would be removed. Timber around switch points and transformer poles would be cleared back sufficiently to allow safe access either from the ground or climbing irons. Vegetation clearance would be monitored on a case-by-case approach and would be minimised and avoided where practicable. All new polesets would be sited away from vegetation to avoid unnecessary removal, and immediately adjacent to existing polesets.
611. During the identification process of possible access tracks, existing tracks/routes such as farmyard entrances were selected. Thus, no habitat clearance would be required for access to the polesets. The maximum width required for access tracks is 3m. The majority of habitats recorded within the access track areas were improved agricultural grassland, with the most sensitive habitats including hedgerows, treelines and rank grassland. No Annex I habitats or rare/protected flora were recorded in these areas, in particular within the Lower River Shannon SAC. Ground disturbance associated with the movement of machinery and personnel along access tracks is not predicted to result in a likely significant negative effect, at any geographic scale.
612. With regard to underground cabling, the worst-case scenario would be that temporary habitat clearance would be required along an 8m-wide corridor for the length of the cable route. Typical configurations for the underground cable would consist of eight cable ducts which would be installed in a trench typically measuring 0.9m wide and 1.2m deep. The trench would be excavated, the ducts installed, the trench backfilled, and the surface reinstated (Chapter 4: Proposed Project Description). Within the 8m-wide corridor, habitat clearance for access to remove the existing structures and to dig the trench would be kept to a minimum. Impacts on terrestrial habitats as a result of the proposed underground cabling include direct temporary habitat loss within the 8m-wide corridor along the length of the cable route, which has the potential to result in a short to long-term, likely significant negative effect, at the local geographic scale. No rare/protected flora were recorded in these areas.
613. With regard to indirect loss of integrity of water-dependent habitats, wetlands and peatlands, the construction methodology would ensure that the drainage pattern of either the surface water or groundwater is not altered because of the proposed infrastructure. This would be achieved as part of the design measures by using the native excavated material as backfill and avoiding the use of imported granular bedding or surround materials where practicable. It would also be achieved using clay 'stanks', which are sections of backfill across the trench in a low permeability material, to prevent unintended longitudinal drainage along the trench.

614. Table 8.55 outlines the potential temporary KER habitat and rare/protected flora loss within the Proposed Project, in hectares or linear metres, as a result of the Proposed Project. This excludes the habitats which would be permanently lost (Table 8.56). It should be noted that none of the terrestrial habitats within the footprint of the Proposed Project are Annex I habitats. Without appropriate mitigation measures in place, the temporary loss of habitats and rare/protected flora identified as KERs are predicted to have short to long-term, likely significant negative effects, at the local to international geographic scale.

Table 8.55: Area (ha) or Length (m) of Temporary Terrestrial Habitat and Flora Loss Within the Proposed Project During the Construction Phase and Summary of Effects (Pre-Mitigation)

Key Ecological Receptor	Evaluation	Temporary Habitat Loss Within Proposed Project (Ha or m)	Summary of Effect
Reservoirs (FL7)	International importance	0.60ha	Likely, short-term, significant negative effect at the international geographic scale
Dry calcareous and neutral grassland (GS1)	Local importance (higher value)	1.47ha	Likely, long-term, significant negative effect at the local geographic scale
Dry-humid acid grassland (GS3)	Local importance (higher value)	2.71ha	Likely, long-term, significant negative effect at the local geographic scale
Wet grassland (GS4)	Local importance (higher value)	33.06ha	Likely, long-term, significant negative effect at the local geographic scale
Wet heath (HH3)	Local importance (higher value)	1.36ha	Likely, long-term, significant negative effect at the local geographic scale
Wet heath and cutover bog mosaic (HH3/PB4)	Local importance (higher value)	4.02ha	Likely, long-term, significant negative effect at the local geographic scale
Wet heath and bog woodland mosaic (HH3/WN7)	Local importance (higher value)	4.75ha	Likely, long-term, significant negative effect at the local geographic scale
Cutover bog (PB4)	Local importance (higher value) – cutover bog with potential to provide habitat for marsh fritillary butterfly	2.57ha	Likely, short-term, significant negative effect at the local geographic scale
Cutover bog and other artificial lakes and ponds mosaic (PB4/FL8)	Local importance (higher value)	4.27ha	Likely, long-term, significant negative effect at the local geographic scale
Cutover bog and bog woodland mosaic (PB4/WN7)	Local importance (higher value)	56.31ha	Likely, long-term, significant negative effect at the local geographic scale
(Mixed) broadleaved woodland (WD1)	Local importance (higher value)	7.55ha	Likely, long-term, significant negative effect at the local geographic scale
(Mixed) broadleaved woodland and scrub mosaic (WD1/WS1)	Local importance (higher value)	0.3ha	Likely, long-term, significant negative effect at the local geographic scale
Mixed broadleaved/conifer woodland (WD2)	Local importance (higher value)	2.52ha	Likely, long-term, significant negative effect at the local geographic scale
Mixed broadleaved/conifer woodland and scrub mosaic (WD2/WS1)	Local importance (higher value)	0.98ha	Likely, long-term, significant negative effect at the local geographic scale
(Mixed) conifer woodland (WD3)	Local importance (higher value)	0.18ha	Likely, long-term, significant negative effect at the local geographic scale
Hedgerows (WL1)	Local importance (higher value)	40,873.10m	Likely, long-term, significant negative effect at the local geographic scale
Hedgerows and stone walls and other stonework mosaic (WL1/BL1)	Local importance (higher value)	214.27m	Likely, long-term, significant negative effect at the local geographic scale

Key Ecological Receptor	Evaluation	Temporary Habitat Loss Within Proposed Project (Ha or m)	Summary of Effect
Hedgerows and earth banks mosaic (WL1/BL2)	Local importance (higher value)	87.97m	Likely, long-term, significant negative effect at the local geographic scale
Hedgerows and dense bracken mosaic (WL1/HD1)	Local importance (higher value)	449.01m	Likely, long-term, significant negative effect at the local geographic scale
Treelines (WL2)	Local importance (higher value)	28,532.61m	Likely, long-term, significant negative effect at the local geographic scale
Treelines and stone walls and other stonework mosaic (WL2/BL1)	Local importance (higher value)	171.06m	Likely, long-term, significant negative effect at the local geographic scale
Treelines and earth banks mosaic (WL2/BL2)	Local importance (higher value)	184.05m	Likely, long-term, significant negative effect at the local geographic scale
Treelines dense bracken mosaic (WL2/HD1)	Local importance (higher value)	29.88m	Likely, long-term, significant negative effect at the local geographic scale
Oak-ash-hazel woodland (WN2)	Local importance (higher value)	0.37ha	Likely, long-term, significant negative effect at the local geographic scale
Riparian woodland (WN5)	Local importance (higher value)	0.15ha	Likely, long-term, significant negative effect at the local geographic scale
Bog woodland (WN7)	Local importance (higher value)	17.89ha	Likely, long-term, significant negative effect at the local geographic scale
Bog woodland and scrub mosaic (WN7/WS1)	Local importance (higher value)	5.11ha	Likely, long-term, significant negative effect at the local geographic scale
Scrub (WS1)	Local importance (higher value)	12.05ha	Likely, long-term, significant negative effect at the local geographic scale
Basil thyme ^a	Local importance (higher value)	NA	Likely, long-term, significant negative effect at the local geographic scale
Yellow archangel ^a	Local importance (higher value)	NA	Likely, long-term, significant negative effect at the local geographic scale

Note:

^a These Red Listed species were noted to be present within the species list of habitats recorded on-site. The exact area of loss was not recorded.

615. Table 8.56 outlines the permanent KER habitat loss, in hectares or linear metres, associated with the proposed 38 kV Uprate Works, RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave (e.g. land-take associated with the Air Valves, Line Valves, Washout Valves and Lay-Bys). It should be noted that none of the terrestrial habitats within the footprint of the RWI&PS are qualifying interests of the Lower River Shannon SAC, and no rare/protected flora were recorded in permanent loss areas. The 20m wide Permanent Wayleave is land within the Proposed Project where Uisce Éireann would retain rights of access for inspection, operation, maintenance and repair of the pipeline and associated infrastructure, and where certain restrictions would apply limiting development and restricting tree planting within the 20m wide Permanent Wayleave. This restriction results in a greater permanent loss of woodland (e.g. WD1, WD2) and treeline habitat within the 20m wide Permanent Wayleave (Table 8.56) associated with the Treated Water Pipeline. The 20m wide Permanent Wayleave is normally positioned centred on the pipeline. Post construction, larger species of trees such as oak or willow would not be planted within the 20m Permanent Wayleave due to the potential impact from their roots on the pipeline. The planting of some smaller trees, shrubs or hedges, are permitted, so long as they do not exceed 4m in height.
616. Furthermore, habitats which cannot be reinstated like-for-like due to their unique nature, complex underlying processes which contribute to their existence, and/or time required to re-establish are also considered to be permanently lost. These habitats (e.g. PB1 mosaics (non-Annex) and PF2) will be replaced with lower ecological value habitat (e.g. PB1 replaced with habitat similar to PB4).

617. Without appropriate mitigation measures in place, the loss of habitats identified as KERs at these sites is predicted to result in permanent, likely significant negative effects, at a local, county and/or international geographic scale.

Table 8.56: Area (ha) or Length (m) of Permanent Habitat Loss Within the Footprint of the Proposed Project (Proposed 38 kV Uprate Works, RWI&PS, WTP, BPT, BPS, FCV, TPR, Access Roads, Permanent Infrastructure and Woodland/Treeline Loss Within 20m Permanent Wayleave and Habitats Which Cannot be Reinstated)

Habitat	Area (ha) or Length (m) of Permanent Habitat Loss										Summary of Effect
	38 kV Uprate Works	RWI&PS	WTP	BPT	BPS	FCV	TPR	Access Roads	Infrastructure & Woodland/Treeline Loss Within 20m Permanent Wayleave	Habitats – Not Reinstated	
Reservoirs (FL7)	—	0.001ha	—	—	—	—	—	—	—	—	Likely, permanent, significant negative effect at the international geographic scale
Dry-humid acid grassland (GS3)	0.0001ha	—	—	—	—	—	—	—	0.008ha	—	Likely, permanent, significant negative effect at the local geographic scale
Wet grassland (GS4)	0.002ha	—	24.14ha	—	—	—	—	0.01ha	0.09ha	—	Likely, permanent, significant negative effect at the local geographic scale
Wet heath (HH3)	—	—	—	—	—	—	—	—	0.009ha	—	Likely, permanent, significant negative effect at the local geographic scale
Wet heath and cutover bog mosaic (HH3/PB4)	—	—	—	—	—	—	—	—	0.02ha	—	Likely, permanent, significant negative effect at the local geographic scale
Wet heath and raised bog mosaic (HH3/PB1)	—	—	—	—	—	—	—	—	—	0.11ha	Likely, permanent, significant negative effect at the county geographic scale
Raised bog (PB1)	—	—	—	—	—	—	—	—	0.003ha	1.13ha	Likely, permanent, significant negative effect at the county geographic scale
Cutover bog (PB4) (Local importance (higher value only))	—	—	—	—	—	—	—	—	0.003ha	—	Likely, permanent, significant negative effect at the local geographic scale
Cutover bog and bog woodland mosaic (PB4/WN7)	—	—	—	—	—	—	—	—	14.6ha	—	Likely, permanent, significant negative effect at the local geographic scale

Habitat	Area (ha) or Length (m) of Permanent Habitat Loss										
	38 kV Uprate Works	RWI&PS	WTP	BPT	BPS	FCV	TPR	Access Roads	Infrastructure & Woodland/Treeline Loss Within 20m Permanent Wayleave	Habitats – Not Reinstated	Summary of Effect
Poor fen and flush (PF2)	—	—	—	—	—	—	—	—	—	0.01ha	Likely, permanent, significant negative effect at the county geographic scale
(Mixed) broadleaved woodland (WD1)	0.0003ha	—	—	0.11ha	—	—	—	0.73ha	2.56ha	—	Likely, permanent, significant negative effect at the local geographic scale
(Mixed) broadleaved woodland and scrub (WD1/WS1)	—	—	—	—	—	—	—	—	0.04ha	—	Likely, permanent, significant negative effect at the local geographic scale
Mixed broadleaved/conifer woodland (WD2)	0.0001ha	0.55ha	—	—	—	—	—	0.92ha	0.97ha	—	Likely, permanent, significant negative effect at the local to international geographic scale
Mixed broadleaved/conifer woodland and scrub (WD2/WS1)	—	—	—	—	—	—	—	—	0.41ha	—	Likely, permanent, significant negative effect at the local geographic scale
(Mixed) conifer woodland (WD3)	—	—	—	—	—	—	—	—	0.08ha	—	Likely, permanent, significant negative effect at the local geographic scale
Oak-ash-hazel-woodland (WN2)	—	—	—	—	—	—	—	—	0.12ha	—	Likely, permanent, significant negative effect at the local geographic scale
Riparian woodland (WN5)	—	—	—	—	—	—	—	—	0.03ha	—	Likely, permanent, significant negative effect at the local geographic scale
Bog woodland (WN7)	—	—	—	—	—	—	—	—	6.31ha	—	Likely, permanent, significant negative effect at the local geographic scale
Bog woodland and scrub (WN7/WS1)	—	—	—	—	—	—	—	—	1.92ha	—	Likely, permanent, significant negative effect at the local geographic scale

Habitat	Area (ha) or Length (m) of Permanent Habitat Loss										Summary of Effect
	38 kV Uprate Works	RWI&PS	WTP	BPT	BPS	FCV	TPR	Access Roads	Infrastructure & Woodland/Treeline Loss Within 20m Permanent Wayleave	Habitats – Not Reinstated	
Scrub (WS1)	0.0001ha	—	—	0.75ha	—	—	0.01ha	0.14ha	0.04ha	—	Likely, permanent, significant negative effect at the local geographic scale
Hedgerows (WL1)	—	—	2,724.86m	6.17m	242.03m	—	985.07m	138.9m	653.05m	—	Likely, permanent, significant negative effect at the local geographic scale
Treelines (WL2)	—	216.87m	1,494.48m	223.85m	319.14m	76.64m	189.95m	488.52m	8,627.27m	—	Likely, permanent, significant negative effect at the local geographic scale

8.5.2.1.2 *Habitat Fragmentation*

618. Permanent or temporary removal of habitats (as quantified in Section 8.5.2.1.1) within the Proposed Project areas during the Construction Phase may cause habitat fragmentation. Plants and other sessile organisms can be disproportionately affected by some types of habitat fragmentation as they cannot respond quickly to changes in the spatial configuration of their habitat (Lienert 2004). Without appropriate mitigation measures in place, habitat fragmentation could have a direct and significant effect on habitats which could include impacts on movements of animal species between the fragments, and plant seed dispersal (Benítez-Malvido and Arroyo-Rodríguez 2008). In the absence of mitigation, habitat fragmentation effects are predicted to result in short to long-term or permanent, likely significant negative effects, at the local geographic scale.

8.5.2.1.3 *Habitat Degradation as a Result of Hydrogeological Impacts*

619. The Proposed Project includes elements of excavation, dewatering and tunnelling, which have the potential to cause habitat degradation as a result of hydrogeological impacts within the receiving ecological environment and overland flow. Construction Phase activities along the Proposed Project have the potential to interact with the hydrogeology of receptors by changing the groundwater/surface water regime upon which the receptor is dependent.
620. Following identification of potential GWDTEs based on extensive mapping data, a hydrogeological assessment (Chapter 10: Soils, Geology and Hydrogeology) was undertaken to determine the likelihood of connectivity between the source (Proposed Project) and receptor (GWDTEs). Note, if a receptor is positioned upgradient or within a different GWDTE groundwater contribution zone, or considered hydrogeologically disconnected from Proposed Project, it is not considered to be at risk.
621. Desk and field studies found there are no GWDTEs at the main infrastructure sites. Thus, during the Construction Phase, groundwater quality impacts from the RWI&PS, WTP, BPT, BPS, FCV or TPR on GWDTEs are not likely to occur and thus there are no likely significant negative effects on terrestrial habitats, at any geographic scale.
622. There are no GWDTE within the Construction Working Width. The potential indirect impacts of the pipeline on the existing hydrogeological regime are discussed in this section. Listed in Table 8.53 are GWBs traversed by or potentially impacted by the Proposed Project. The Proposed Project is not located within any delineated GWDTE GWB. Therefore, there are no direct effects on GWDTEs. The main pressures on GWDTEs are abstraction/drainage and nutrient inputs. The Proposed Project has the potential to cause an indirect impact on groundwater levels in the receiving environment as it would require the short-term localised lowering of groundwater levels by the dewatering of soils and bedrock during the Construction Phase.
623. During the Construction Phase there is a risk of groundwater pollution from accidental (small scale 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. Construction may locally alter the pH and chemistry along the Treated Water Pipeline where cement, for example, is used. Although the significance of such an impact on groundwater is likely to be imperceptible/slight, similar backfill would be used in these areas which would ensure the pH, conductivity and hardness is similar to the local or background water quality.

624. An integrated hydro-ecological approach to the identification of GWDTEs was made for the Proposed Project to allow direct or indirect impacts to be avoided by design, or appropriate mitigation measures to be considered (Chapter 10: Soils, Geology and Hydrogeology). Conceptual zones of groundwater contribution were developed for these potentially sensitive GWDTEs using the area identified as being up hydraulic gradient of the GWDTE based upon the soils, subsoils, bedrock and topographic information. Previously unidentified potential GWDTEs and key habitats were recorded during habitat surveys for the Proposed Project. The Zols of these GWDTEs were avoided by re-routing previous iterations of the project (Section 8.1.1). For example, the pipeline was re-routed to the east of Coagh Fen to avoid the fen Zol. The Proposed Project has therefore avoided potential direct hydrogeological impacts on intact peatland sites/active raised bogs. Details of these GWDTEs are provided in Table 8.52 and Chapter 10 (Soils, Geology and Hydrogeology).
625. A raised bog is a peatland ecosystem that is primarily fed by precipitation (ombrotrophic) rather than groundwater or surface water. However, in some cases, raised bogs or parts of a raised bog can exhibit characteristics of being GWDTEs. This occurs when the bog's hydrology is influenced by groundwater inputs, either directly or indirectly. In certain situations, groundwater can seep upward into the bog from beneath, particularly when the bog is situated over permeable sediments or fractured bedrock. The edges of an active raised bog (lagg zone) may be influenced by groundwater discharge from the surrounding mineral soil. Groundwater can maintain wetter conditions at the margins, supporting vegetation that differs from the central, purely rainwater-fed part of the bog. Within the Proposed Project, all of the bogs are modified to highly modified. No areas of lagg or groundwater springs were identified in the peatland areas. Water levels in the peatlands are between 0.4m and 2.6m below ground level as detailed in Chapter 10 (Soils, Geology and Hydrogeology). Based on the low groundwater levels in the peat and low percentage of sphagnum (<5%; Appendix A8.4: Targeted Habitat Survey Report) in the degraded raised bog areas, the peatlands are not considered active raised bog and are not GWDTE. In summary, no peatlands with GWDTEs were identified along the Proposed Project. There is no active peatland present based on the ecological specialist wetland/peatland surveys. There are no areas of central or sub-central ecotopes (active raised bogs) along the Proposed Project. Central or subcentral ecotopes are characterised by sphagnum dominated vegetation. There is therefore no potential for direct or indirect hydrogeological impacts on active raised bogs, and thus there are no likely significant effects on GWDTE habitats, at any geographic scale.

8.5.2.1.4 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species and Pathogens

626. Machinery and construction activities can introduce and disperse INNS to new areas (Engineers Ireland 2017). The most common ways that INNS are introduced to a site are through contaminated topsoil, vehicle and tool contamination, and fly-tipping (Engineers Ireland 2017). Without appropriate mitigation measures in place, effects on terrestrial habitats associated with the introduction and dispersal of INNS, are predicted to have medium-term (effects lasting seven to 15 years), likely significant negative effects, at the local geographic scale.
627. The proposed construction works could potentially introduce and spread INNS within the Zol of the Proposed Project. Although the following are terrestrial species, in the absence of mitigation, the introduction or spread of INNS such as Japanese knotweed, Himalayan knotweed, giant hogweed, rhododendron, and Himalayan balsam (which were recorded in the study area), are predicted to have long-term, likely significant negative effects on riparian habitats, at the international geographic scale (Table 8.65).

628. It is important to highlight the potential impact of the spread of ash dieback during the Construction Phase of the Proposed Project, primarily during vegetation clearance. Ash dieback, which is a fungal disease caused by the organism *Hymenoscyphus fraxineus*, was first recorded in Ireland in 2012 and is now widespread across the country and Europe (DAFM 2022). Ash dieback is a windborne and airborne disease which has led to the rapid decline in Irish native broadleaves with each consecutive year since its introduction. This was likely to have been a result of the movement of an infected ash plant into Ireland from another EU Member State (DAFM 2022). This disease is likely to have a significant effect on hedgerows, treelines and the Irish landscape over the coming years as it leads to the mortality of the species, threatening the existence of ash within Ireland, which is a significant component in 91% of Irish native woodlands (McCracken *et al.* 2017). Without appropriate mitigation measures in place, vegetation clearance during the Construction Phase of the Proposed Project may lead to the introduction/spread of ash dieback within the Proposed Project and adjacent areas, which has the potential to have medium-term, likely significant negative effects on terrestrial habitats, at the local geographic scale.

8.5.2.1.5 *Habitat Degradation as a Result of Air Quality Impacts*

629. Dust deposition arising from construction activities could, in extreme circumstances, locally affect the extent, diversity, and vegetation composition or structure of terrestrial habitats that are present within the Zol (50m) of the Proposed Project. For example, dust falling onto plants may physically smother the leaves. Therefore, the Proposed Project has the potential to result in short-term, likely significant negative effects, at the local geographic scale.
630. With regard to Construction Phase traffic emissions and the resulting effects on air quality due to increased pollutant levels, the assessment considered sensitive receptors which have the potential to be affected by the Proposed Project (e.g. designated sites within 200m of road links (Chapter 12: Air Quality), as per TII (2022) guidelines). Ecologically sensitive sites are considered in Section 8.5.1.1.5 and Section 8.5.1.2.3. No other ecological sensitive sites were identified within the Zol of the Proposed Project. Therefore, there are no likely significant negative effects on terrestrial ecology, at any geographic scale.

Table 8.57: Summary of Pre-Mitigation Effects Upon Terrestrial Habitats and Flora During Construction of the Proposed Project

Key Ecological Receptor	Evaluation	Location and Area (ha) or Length (m)	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
Reservoirs (FL7)	International importance	Parteen Basin; 0.60ha	- Habitat loss - Habitat fragmentation - Habitat degradation - Introduction of INNS and pathogens	- Habitat loss and fragmentation – construction activities, including excavation, storage of excavated materials, vegetation clearance and topsoil stripping could result in a loss or fragmentation of habitats and/or rare/protected flora within the Proposed Project. - Habitat degradation – excavation and tunnelling have the potential to cause habitat degradation as a result of hydrogeological or air quality impacts within the receiving ecological environment. - Introduction of INNS and pathogens – machinery and construction activities could introduce and disperse INNS and pathogens to new areas.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: International geographic scale
Reservoirs (FL7)	International importance	Parteen Basin; 0.001ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent - Extent: International geographic scale
Dry calcareous and neutral grassland (GS1)	Local importance (higher value)	Discrete pockets throughout the Proposed Project; 1.47ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Dry-humid acid grassland (GS3)	Local importance (higher value)	Derryvarroge, County Kildare; 2.71ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Dry-humid acid grassland (GS3)	Local importance (higher value)	Derryvarroge, County Kildare; 0.008ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: Local geographic scale

Key Ecological Receptor	Evaluation	Location and Area (ha) or Length (m)	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
Wet grassland (GS4)	Local importance (higher value)	Counties Tipperary and Offaly; 33.06ha	- Habitat loss - Habitat fragmentation - Habitat degradation - Introduction of INNS and pathogens	- Habitat loss and fragmentation – construction activities, including excavation, storage of excavated materials, vegetation clearance and topsoil stripping could result in a loss or fragmentation of habitats and/or rare/protected flora within the Proposed Project. - Habitat degradation – excavation and tunnelling have the potential to cause habitat degradation as a result of hydrogeological or air quality impacts within the receiving ecological environment. - Introduction of INNS and pathogens – machinery and construction activities could introduce and disperse INNS and pathogens to new areas.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Wet grassland (GS4)	Local importance (higher value)	Counties Tipperary and Offaly; 24.24ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: Local geographic scale
Wet heath (HH3)	Local importance (higher value)	County Kildare; 1.36ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Wet heath (HH3)	Local importance (higher value)	County Kildare; 0.009ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: Local geographic scale
Wet heath and cutover bog mosaic (HH3/PB4)	Local importance (higher value)	County Kildare; 4.02ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Wet heath and cutover bog mosaic (HH3/PB4)	Local importance (higher value)	County Kildare; 0.02ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: Local geographic scale

Key Ecological Receptor	Evaluation	Location and Area (ha) or Length (m)	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
Wet heath and raised bog mosaic (HH3/PB1)	County Importance	Derrylahen, County Kildare; 0.11ha	- Habitat loss - Habitat fragmentation - Habitat degradation - Introduction of INNS and pathogens	- Habitat loss and fragmentation – construction activities, including excavation, storage of excavated materials, vegetation clearance and topsoil stripping could result in a loss or fragmentation of habitats and/or rare/protected flora within the Proposed Project. - Habitat degradation – excavation and tunnelling have the potential to cause habitat degradation as a result of hydrogeological or air quality impacts within the receiving ecological environment. - Introduction of INNS and pathogens – machinery and construction activities could introduce and disperse INNS and pathogens to new areas.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: County geographic scale
Wet heath and bog woodland mosaic (HH3/WN7)	Local importance (higher value)	Derrylahen, County Kildare; 4.75ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Cutover bog (PB4)	Local importance (higher value)	County Offaly; 2.57ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term (Construction Working Width) - Extent: Local geographic scale
Cutover bog (PB4)	Local importance (higher value)	County Offaly; 0.003ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: Local geographic scale
Cutover bog and other artificial lakes and ponds mosaic (PB4/FL8)	Local importance (higher value)	4.27ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Cutover bog and bog woodland mosaic (PB4/WN7)	Local importance (higher value)	56.31ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale

Key Ecological Receptor	Evaluation	Location and Area (ha) or Length (m)	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
Cutover bog and bog woodland mosaic (PB4/WN7)	Local importance (higher value)	14.6ha	- Habitat loss - Habitat fragmentation - Habitat degradation - Introduction of INNS and pathogens	- Habitat loss and fragmentation – construction activities, including excavation, storage of excavated materials, vegetation clearance and topsoil stripping could result in a loss or fragmentation of habitats and/or rare/protected flora within the Proposed Project. - Habitat degradation – excavation and tunnelling have the potential to cause habitat degradation as a result of hydrogeological or air quality impacts within the receiving ecological environment. - Introduction of INNS and pathogens – machinery and construction activities could introduce and disperse INNS and pathogens to new areas.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: Local geographic scale
Raised bog (PB1)	Local importance (higher value)	Counties Offaly and Kildare; 1.13ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: County geographic scale
(Mixed) broadleaved woodland (WD1)	Local importance (higher value)	Common throughout the Proposed Project; 7.55ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
(Mixed) broadleaved woodland (WD1)	Local importance (higher value)	Common throughout the Proposed Project; 2.56ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: Local geographic scale
(Mixed) broadleaved woodland and scrub mosaic (WD1/WS1)	Local importance (higher value)	0.3ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
(Mixed) broadleaved woodland and scrub mosaic (WD1/WS1)	Local importance (higher value)	0.04ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: Local geographic scale

Key Ecological Receptor	Evaluation	Location and Area (ha) or Length (m)	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
Mixed broadleaved/conifer woodland (WD2)	Local importance (higher value)	Common throughout the Proposed Project; 2.52ha	- Habitat loss - Habitat fragmentation - Habitat degradation - Introduction of INNS and pathogens	- Habitat loss and fragmentation – construction activities, including excavation, storage of excavated materials, vegetation clearance and topsoil stripping could result in a loss or fragmentation of habitats and/or rare/protected flora within the Proposed Project. - Habitat degradation – excavation and tunnelling have the potential to cause habitat degradation as a result of hydrogeological or air quality impacts within the receiving ecological environment. - Introduction of INNS and pathogens – machinery and construction activities could introduce and disperse INNS and pathogens to new areas.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Mixed broadleaved/conifer woodland (WD2)	Local importance (higher value)	Common throughout the Proposed Project; 2.44ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: Local geographic scale
Mixed broadleaved/conifer woodland and scrub mosaic (WD2/WS1)	Local importance (higher value)	Esker More, County Offaly; 0.98ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Mixed broadleaved/conifer woodland and scrub mosaic (WD2/WS1)	Local importance (higher value)	Esker More, County Offaly; 0.41ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: Local geographic scale
(Mixed) conifer woodland (WD3)	Local importance (higher value)	0.18ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
(Mixed) conifer woodland (WD3)	Local importance (higher value)	0.08ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: Local geographic scale

Key Ecological Receptor	Evaluation	Location and Area (ha) or Length (m)	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
Poor fen and flush (PF2)	County importance	Derryvarroge, County Kildare; 0.01ha	- Habitat loss - Habitat fragmentation - Habitat degradation - Introduction of INNS and pathogens	- Habitat loss and fragmentation – construction activities, including excavation, storage of excavated materials, vegetation clearance and topsoil stripping could result in a loss or fragmentation of habitats and/or rare/protected flora within the Proposed Project. - Habitat degradation – excavation and tunnelling have the potential to cause habitat degradation as a result of hydrogeological or air quality impacts within the receiving ecological environment. - Introduction of INNS and pathogens – machinery and construction activities could introduce and disperse INNS and pathogens to new areas.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: County geographic scale
Hedgerows (WL1)	Local importance (higher value)	Common throughout the Proposed Project; 40,873.10m			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Hedgerows (WL1)	Local importance (higher value)	Common throughout the Proposed Project; 4,750.08m			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: Local geographic scale
Hedgerows and stone walls and other stonework mosaic (WL1/BL1)	Local importance (higher value)	214.27m			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Hedgerows and earth banks mosaic (WL1/BL2)	Local importance (higher value)	87.97m			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Hedgerows and dense bracken mosaic (WL1/HD1)	Local importance (higher value)	449.01m			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale

Key Ecological Receptor	Evaluation	Location and Area (ha) or Length (m)	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
Treelines (WL2)	Local importance (higher value)	Common throughout the Proposed Project; 28,532.61m	- Habitat loss - Habitat fragmentation - Habitat degradation - Introduction of INNS and pathogens	- Habitat loss and fragmentation – construction activities, including excavation, storage of excavated materials, vegetation clearance and topsoil stripping could result in a loss or fragmentation of habitats and/or rare/protected flora within the Proposed Project. - Habitat degradation – excavation and tunnelling have the potential to cause habitat degradation as a result of hydrogeological or air quality impacts within the receiving ecological environment. - Introduction of INNS and pathogens – machinery and construction activities could introduce and disperse INNS and pathogens to new areas.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Treelines (WL2)	Local importance (higher value)	Common throughout the Proposed Project; 11,636.72m			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: Local geographic scale
Treelines and stone walls and other stonework mosaic (WL2/BL1)	Local importance (higher value)	171.06m			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Treelines and earth banks mosaic (WL2/BL2)	Local importance (higher value)	184.05m			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Treelines dense bracken mosaic (WL2/HD1)	Local importance (higher value)	29.88m			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Oak-ash-hazel woodland (WN2)	Local importance (higher value)	Counties Tipperary and Offaly; 0.37ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale

Key Ecological Receptor	Evaluation	Location and Area (ha) or Length (m)	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
Oak-ash-hazel woodland (WN2)	Local importance (higher value)	Counties Tipperary and Offaly; 0.12ha	- Habitat loss - Habitat fragmentation - Habitat degradation - Introduction of INNS and pathogens	- Habitat loss and fragmentation – construction activities, including excavation, storage of excavated materials, vegetation clearance and topsoil stripping could result in a loss or fragmentation of habitats and/or rare/protected flora within the Proposed Project. - Habitat degradation – excavation and tunnelling have the potential to cause habitat degradation as a result of hydrogeological or air quality impacts within the receiving ecological environment. - Introduction of INNS and pathogens – machinery and construction activities could introduce and disperse INNS and pathogens to new areas.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: Local geographic scale
Riparian woodland (WN5)	Local importance (higher value)	Gallery woodland along riparian margins in areas throughout the Proposed Project; 0.15ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Riparian woodland (WN5)	Local importance (higher value)	Gallery woodland along riparian margins in areas throughout the Proposed Project; 0.03ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: Local geographic scale
Bog woodland (WN7)	Local importance (higher value)	Cutover bog and along bog margins in areas throughout the Proposed Project; 17.89ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Bog woodland (WN7)	Local importance (higher value)	Cutover bog and along bog margins in areas throughout the Proposed Project; 6.31ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: Local geographic scale
Bog woodland and scrub mosaic (WN7/WS1)	Local importance (higher value)	5.11ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale

Key Ecological Receptor	Evaluation	Location and Area (ha) or Length (m)	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
Bog woodland and scrub mosaic (WN7/WS1)	Local importance (higher value)	1.92ha	- Habitat loss - Habitat fragmentation - Habitat degradation - Introduction of INNS and pathogens	- Habitat loss and fragmentation – construction activities, including excavation, storage of excavated materials, vegetation clearance and topsoil stripping could result in a loss or fragmentation of habitats and/or rare/protected flora within the Proposed Project. - Habitat degradation – excavation and tunnelling have the potential to cause habitat degradation as a result of hydrogeological or air quality impacts within the receiving ecological environment. - Introduction of INNS and pathogens – machinery and construction activities could introduce and disperse INNS and pathogens to new areas.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: Local geographic scale
Scrub (WS1)	Local importance (higher value)	Common throughout the Proposed Project; 12.05ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Scrub (WS1)	Local importance (higher value)	Common throughout the Proposed Project; 0.94ha			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent (Infrastructure) - Extent: Local geographic scale
Basil thyme	Local importance (higher value)	Mount Lucas, County Offaly and Cushaling and Ticknevin, County Kildare			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale
Yellow archangel	Local importance (higher value)	Near Chainage TW – 34100			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term (Construction Working Width) - Extent: Local geographic scale

Note: Cells highlighted grey are associated with permanent habitat loss.

8.5.2.2 Mammals – Bats

631. The results of the bat surveys (Appendix A8.9: Bat Surveys Report) for the Proposed Project indicate that the study area supports nine bat species, with roosting potential for all of those species. Similarly, the desktop data analysis showed at least eight species of bat are supported within the study area, with known roosts identified for seven of the eight.
632. The Construction Phase of the Proposed Project has the potential to result in the following impacts:
- Loss of a lesser horseshoe bat night roost and Natterer's bat and brown long-eared bat day roost as a result of the loss of Building 1 at the WTP site
 - Loss of one soprano pipistrelle day roost as a result of tree removal in Parteen Woodland at the RWI&PS site
 - Loss of three tree roosts (day and satellite) for Natterer's bat and common and soprano pipistrelles
 - Extensive removal of linear habitats, a large proportion of which are located within CSZs considered to be important for local bat populations. This would increase fragmentation of the wider landscape located along the Proposed Project. Apart from the Leisler's bat, which forages in the open landscape, Irish bat species are particularly vulnerable to linear developments due to their use of hedgerow and treeline corridors when commuting through the wider landscape
 - A small increase in human activity (noise and light levels)
 - An additional 27 individual trees, six treelines and one cluster were identified as having a PBR within the Proposed Project, the majority of which are Category 2 PBRs. However, in comparison to the length of the Proposed Project, the route avoids numerous mature trees.
633. No buildings, structures or mature trees considered to be of high potential for bat roosts would be directly impacted by the 38 kV Uprate Works. Works would be undertaken during daylight hours, therefore there is potential for disturbance to any unknown tree roosts. Thus, it is considered, in the absence of mitigation and taking into account the level of construction required for the 38 kV Uprate Works, the effects on roosting bats are thought to be negligible, due to the little vegetation removal that would be carried out.
634. Potential direct impacts on bat populations and their habitats include habitat fragmentation, loss of bat roost habitat and mortality or injury to bats. Potential indirect impacts on bat populations and their habitats include increased disturbance. It is anticipated that the Construction Phase of the principal elements of the Proposed Project would be over a five year period. However, based on the portion-based approach outlined in Chapter 5 (Construction & Commissioning), the timescales would be shorter, with approximately 24 months between the initial occupation of the land and subsequent 'hand back' subject to any seasonal constraints for reinstatement. Therefore, the potential impacts are examined in relation to this timeframe. The potential impacts associated with the Construction Phase are presented in Table 8.59.

8.5.2.2.1 Habitat Loss and Habitat Fragmentation

635. Hedgerows and treelines are used for foraging or commuting from roost to foraging habitats by the majority of Irish bat species, including Natterer's bat, Daubenton's bat, whiskered bat, common pipistrelle, soprano pipistrelle and the brown long-eared bat (Stone 2013).
636. Permanent/temporary removal of linear features such as hedgerows and treelines during the Construction Phase could cause fragmentation of established flight paths and may permanently or temporarily alter or deter bats from using the commuting corridor and gaining access to foraging habitats (Entwistle *et al.* 2001). Increased habitat fragmentation could potentially cause isolation of bat roosts. For example, if a commuting route between a maternity roost and a foraging ground is removed, the

roost could be cut off from feeding areas. The fragmentation of foraging habitats could also lead to a reduction of prey species abundance (i.e. reduced insect abundance due to loss of suitable habitat), reducing the amount of prey available for bats in an area, causing them to travel further in search of food (Hallmann 2017). Without appropriate mitigation measures in place, habitat fragmentation is predicted to result in medium-term, likely significant negative effects on the conservation status of bats, at the local geographic scale.

637. Due to the length of the Proposed Project, habitat loss (potential roosting/foraging/commuting habitat) is predicted to have medium-term (for habitat which will be reinstated) or permanent (for the habitat which will not be reinstated), likely significant negative effects, on the conservation status of bat species at the local to county geographic scale.

8.5.2.2.2 Loss of Bat Roost Habitat

638. The proposed construction works would result in the loss of five active bat roosts along the Proposed Project, which include one night and day roost (a building) and four day and satellite tree roosts (Table 8.58). A sixth roost was recorded within a building (Building 47) located within the Proposed Project; however, this building would remain as the works proposed within this area relate to power lines, which would not impact on the bat roost within the building.
639. Effects associated with roost loss during the construction works are predicted to have permanent, likely significant negative effects on the conservation status of these bat species (Table 8.58), at the local geographic scale.

Table 8.58: Loss of Bat Roosts

Bat Species	Roosts	Potential Impact
Lesser horseshoe bat Natterer's bat Brown long-eared bat	Night Roost for lesser horseshoe bat and Day Roost for Natterer's bat and brown long-eared bat – Building 1 (Incha Beg)	Loss of Night and Day Roost
Soprano pipistrelle	Tree Roost – Parteen Wood	Loss of Day Roost
Natterer's bat	Tree Roost – PBR 8	Loss of Day Roost
Common pipistrelle	Tree Roost – PBR 20	Loss of small Satellite Roost
Soprano pipistrelle	Tree Roost – PBR 20	Loss of small Satellite Roost

640. Permanent removal of mature trees from treelines or woodlands would reduce the number of available roosting sites for bats. There is also potential for bats to take up residence in a new roost, post baseline field surveys and pre-construction. In such a case, without appropriate mitigation measures in place, these impacts are predicted to have permanent, likely significant negative effects on the conservation status of bats, at the local geographic scale.
641. The proposed construction works would also result in the loss of trees and structures which were identified as having PBRs. A total of 27 individual trees, six treelines and one cluster were identified as having a PBR within the Proposed Project, the majority of which are Category 2 PBRs. Roost loss of PBRs for all bat species is predicted to have a permanent, likely significant negative effect on the conservation status of bats, at a local geographic scale.

8.5.2.2.3 Mortality or Injury to Bats

642. The removal of vegetation during site clearance works would include pruning/removal of woody vegetation such as trees or ivy which bats may be using as a roosting site during daylight hours. This could cause injury or death to bats using the vegetation as a roost. Lacking mitigation, the impacts

associated with site clearance works are predicted to result in a permanent, likely significant negative effect on the conservation status of bats, at the local geographic scale.

8.5.2.2.4 Disturbance/Displacement

643. Construction activities and increased human presence during the Construction Phase could result in increased disturbance as a result of light and noise pollution. Light pollution could have likely significant negative effects on bat species within the Zol of the Proposed Project, particularly on *Myotis* sp. *Myotis* sp. such as the whiskered bat, Natterer's bat and Daubenton's bat all display an intolerance to light and would avoid areas illuminated with high wavelength light (Rowse *et al.* 2015). Studies have shown this group of bats would avoid commuting routes with low level Light Emitting Diode (LED) lighting of 3.7 lux (luminous flux per unit area) (Stone *et al.* 2012; Stone 2013). Research has also shown that bats' eyes work best in dim light and some species may use sight during roost emergence rather than echolocation (Eklöf 2003). Thus, an increase in lighting could potentially disorientate some bat species causing them to abandon their roost (Rydell *et al.* 2017). Furthermore, lighting directed onto a roost entrance can cause bats to delay emergence or even abandon the roost. Lighting can also cause bats to forgo established flight lines, preventing movement into feeding areas. This can reduce the amount of time spent foraging and can negatively affect body weight, reproduction rates and the capacity to survive hibernation (Stone 2013).
644. Bat species, such as the brown long-eared bat, rely on their ears as much as echolocation for finding prey. Excessive noise pollution could prevent these bats from finding prey, which could result in lack of food and increased mortality. Anthropogenic noise affects bats in a number of ways, namely noise avoidance, a reduction of echolocation effectiveness, and/or reduced attention (Luo *et al.* 2015). Noise interference on an animal's ability to detect sound, known as acoustic masking, can occur when the noise being made is similar in frequency to the bat's echolocation calls. Therefore, noise can increase the amount of time and energy spent foraging for prey. Research has shown bat species that emit low frequency echolocation calls (<35 kHz) showed a 70% decrease in activity levels near loud sites (Bunkley *et al.* 2015). As a result, the bats would avoid a noisy foraging area altogether (Luo *et al.* 2015). Hibernating bats are also vulnerable to noise disturbance (Luo *et al.* 2014). Luo *et al.* (2014) found that bats become more sensitive to noise as dusk approaches, suggesting that the time of the day affects the response bats will have to external noise sources, with responses noted as bats prepare to wake in preparation for foraging prior to dusk. Studies have found that noise levels that negatively impact bats tend to be 80dB to 90dB or greater, negative impacts are reduced once the noise source is greater than 40m from the bat, and bats typically return to the habitat when the noise ceases (Anderson and Wheatley 2008; Gilmour *et al.* 2021; Hooker *et al.* 2023). Construction noise levels associated with the Proposed Project vary depending on the construction activity within the Proposed Project and are detailed in Chapter 6 (Noise & Vibration). In the absence of mitigation, the highest cumulative plant noise level at 10m distance is 89dB (at the RWI&PS site). For the pipe installation and backfilling works, the cumulative plant noise level at 10m distance is 86dB.
645. Effects associated with disturbance and/or displacement on all bat species during the Construction Phase are considered to have short-term, likely significant negative effects on the conservation status of bats, at the county geographic scale.

8.5.2.2.5 Bats – Summary of Effects During Construction

646. Table 8.59 summarises the potential Construction Phase impacts and associated effects on bats. In the absence of mitigation measures there is potential for significant effects on the nine Irish bat species.

Table 8.59: Summary of Pre-Mitigation Effects Upon Bats During Construction of the Proposed Project

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
Common pipistrelle	Local importance (higher value) – Annex IV of Habitats Directive and Wildlife Acts	Common and widespread throughout the Proposed Project (Figure 3e in Appendix A8.9: Bat Surveys Report).	- Habitat loss and fragmentation - Loss of bat roost habitat - Mortality or injury to bats - Disturbance/displacement	- The common pipistrelle is a common and widespread species of bat in Ireland. Common pipistrelle was the second most frequently recorded bat species and was recorded throughout the study area. Fifteen common pipistrelle roosts were confirmed outside, but in close proximity to, the Proposed Project, while one tree roost was confirmed within the Proposed Project which would be directly impacted and lost due to the proposed construction works, resulting in a negative impact. The construction works would result in the loss of foraging/commuting habitat linked to these roosts resulting in a negative impact - Bat Conservation Ireland data indicate four other roosts are located within a 2km buffer zone of the Proposed Project; however, all of these are outside of the Proposed Project (the closest being 35m away). No known common pipistrelle roost would be directly impacted or lost as a result of construction of the Proposed Project - The construction of the Proposed Project would result in a loss of important foraging and commuting corridors via habitat fragmentation through the removal of treelines and hedgerows. This fragmentation could also result in a loss of prey insects available to bats leading to an increase in distances travelled to find food (Hallmann 2017) - Light and noise pollution and an increase in human activity during the construction of the Proposed Project could potentially cause common pipistrelles to delay emergence from, or abandon, their roosts. Light and noise pollution and an increase in human activity could also negatively affect their foraging behaviour through avoidance or abandonment of established foraging and commuting flight pathways (Rowse <i>et al.</i> 2015; Stone 2013) - This species is common and widespread in Ireland and would make use of alternative suitable habitats and potential roost sites in the wider surrounding landscape; this therefore reduces the potential for significant effects to occur.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term (disturbance) Medium-term (habitat loss and fragmentation) Permanent (loss of roost) - Extent: Local to county geographic scale
Soprano pipistrelle		Common and widespread throughout the Proposed Project (Figure 3f in Appendix A8.9: Bat Surveys Report).	- Habitat loss and fragmentation - Loss of bat roost habitat - Loss of roost - Mortality or injury to bats - Disturbance/displacement	- The soprano pipistrelle is a common and widespread species of bat in Ireland and was the most recorded species throughout the study area. Six confirmed roosts were recorded within the study area, but outside the Proposed Project. Only one of the roosts, a tree roost, would be directly impacted and lost due to the proposed construction works which would result in a negative impact. The construction works would result in the loss of suitable foraging and commuting habitat located in close proximity to the remaining eight roosts which would result in a slight negative impact on the bats within the roosts - Bat Conservation Ireland data indicate eight other roosts are located within a 2km buffer zone of the Proposed Project; however, all of these are outside of the Proposed Project (the closest being 35m away). No known soprano pipistrelle roost would be directly impacted or lost as a result of construction of the Proposed Project - The construction of the Proposed Project would result in the loss of important foraging and commuting corridors via habitat fragmentation through the removal of treelines and hedgerows. Important treelines leading from the confirmed roosts would be lost. This fragmentation could also result in a loss of prey insect species available to bats leading to an increase in distances travelled to find food (Hallmann 2017) - Without appropriate mitigation measures in place, the construction of the RWI&PS at Parteen Basin could potentially have a significant impact on roosting bats in Parteen woodland through an increase in human disturbance, noise, vibration and lighting. Trees would be felled at Parteen woodland and there is a potential for new roost loss and individual mortality in the absence of appropriate mitigation - Light and noise pollution and an increase in human activity during the construction of the Proposed Project could potentially cause soprano pipistrelles to delay emergence from, or abandon, their roosts. Light and noise pollution and an increase in human activity could also negatively affect their foraging behaviour through avoidance or abandonment of established foraging and commuting flight pathways (Rowse <i>et al.</i> 2015; Stone 2013) - This species is common and widespread in Ireland and would make use of alternative suitable habitats and potential roost sites in the wider surrounding landscape; this therefore reduces the potential for significant effects to occur.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term (disturbance) Medium-term (habitat loss and fragmentation) Permanent (loss of roost) - Extent: Local to county geographic scale
Leisler's bat		Common and widespread throughout the Proposed Project (Figure 3g in Appendix A8.9: Bat Surveys Report).	- Habitat loss and fragmentation - Loss of bat roost habitat - Mortality or injury to bats - Disturbance/displacement	- The Leisler's bat was found to occur throughout the study area and was the third most common species recorded during the surveys. In Ireland, this species has been more frequently recorded roosting in buildings. However, 13% of known roosts for this species of bat are recorded roosting in trees (BCIreland 2017). For the Proposed Project, five roosts have been recorded, four in buildings and one in a tree. The four buildings recorded as roosts were located in derelict buildings within the study area. Three of the buildings are located outside the Proposed Project and would not be directly impacted by the Proposed Project. The fourth building is located within the Proposed Project but the proposed works (power line) in the vicinity of the building would not impact on the building. The construction works would result, however, in the loss of suitable foraging and commuting habitat located in close proximity to the roost sites which would result in a negative impact on the bats within the roosts. - Bat Conservation Ireland data indicate nine other roosts are located within a 2km buffer zone of the Proposed Project; however, all of these are outside of the Proposed Project (the closest being 980m away). No known Leisler's bat roost would be directly impacted or lost as a result of construction of the Proposed Project - This species forages in open areas, therefore habitat fragmentation of commuting and foraging corridors would have less of a negative effect on this species compared with other bats such as <i>Pipistrelle</i> and <i>Myotis</i> species. However, it is noted that there is suitable foraging and commuting habitat located on either side of the Proposed Project, close to the roosts which may be impacted - Light and noise pollution and an increase in human activity during the construction of the Proposed Project could potentially cause Leisler's bat to delay emergence from, or abandon, their roosts. Light and noise pollution and an increase in human activity could also negatively affect their foraging behaviour through avoidance or abandonment of established foraging and commuting flight pathways (Rowse <i>et al.</i> 2015; Stone 2013) - This species is common and widespread in Ireland and would make use of alternative suitable habitats and potential roost sites in the wider surrounding landscape; this therefore reduces the potential for significant effects to occur.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term (disturbance) Medium-term (habitat loss and fragmentation) - Extent: Local to county geographic scale

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
Daubenton's bat	Local importance (higher value) – Annex IV of Habitats Directive and Wildlife Acts	Less common but widely distributed throughout the Proposed Project. Tend to be recorded on watercourses. One tree roost recorded outside the Proposed Project in Parteen Woodland (Figure 3i in Appendix A8.9: Bat Surveys Report).	- Habitat loss and fragmentation - Loss of bat roost habitat - Mortality or injury to bats - Disturbance/displacement	- The Daubenton's bat is known to roost in hollow trees in woodlands or under bridges (BCIreland 2017). One tree roost was recorded within the study area but outside of the Proposed Project. The construction works would avoid the felling of this tree - Bat Conservation Ireland data indicate no known roosts are located within a 2km buffer zone of the Proposed Project for this bat species - This species is known for foraging low, over water bodies such as ponds, lakes and slow-flowing rivers. Thus, the construction of the RWI&PS at Parteen Basin and the watercourse crossings along the length of the Proposed Project, could temporarily disturb key foraging areas for this species of bat. The construction of the RWI&PS and watercourse crossings could negatively impact water quality which in turn could affect the availability of freshwater invertebrate prey species - It has been shown that <i>Myotis</i> species, such as Daubenton's bat, do not like to fly across open areas; therefore, the creation of even a 10m gap along a linear corridor (through the removal of treelines and hedgerows) may result in a loss of important foraging and commuting corridors (Entwistle <i>et al.</i> 2001) - Light and noise pollution and an increase in human activity during the construction of the Proposed Project could potentially cause Daubenton's bat to delay emergence from, or abandon, their roosts. Light and noise pollution and an increase in human activity could also negatively affect their foraging behaviour through avoidance or abandonment of established foraging and commuting flight pathways (Rowse <i>et al.</i> 2015; Stone 2013).	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term (disturbance) Medium-term (habitat loss and fragmentation) - Extent: Local to county geographic scale
Natterer's bat		Less common but widely distributed throughout the Proposed Project (Figure 3j in Appendix A8.9: Bat Surveys Report).	- Habitat loss and fragmentation - Loss of bat roost habitat - Loss of roost - Mortality or injury to bats - Disturbance/displacement	- The Natterer's bat is a less common species of bat in Ireland. Ten roosts were confirmed within the study area but nine were located outside the Proposed Project, while one tree roost was confirmed within the Proposed Project which would be directly impacted and lost due to the proposed construction works, resulting in a negative impact. None of the remaining nine roosts would be directly impacted or lost from the proposed construction works. The construction works would, however, result in the loss of suitable foraging and commuting habitat located in close proximity to the roost which would result in a negative impact on the bats within the roosts - Bat Conservation Ireland data indicate no known roosts are located within a 2km buffer zone of the Proposed Project for this bat species. This species uses woodland, treelines, mature hedgerows and waterways as commuting and foraging corridors. The construction of the Proposed Project would result in the loss of important foraging and commuting corridors via habitat fragmentation through the removal of treelines and hedgerows. This fragmentation could also result in a loss of prey insect species available to bats leading to an increase in distances travelled to find food (Hallmann 2017) - Light and noise pollution and an increase in human activity during the construction of the Proposed Project could potentially cause Natterer's bat to delay emergence from, or abandon, their roosts. Light and noise pollution and an increase in human activity could also negatively affect their foraging behaviour through avoidance or abandonment of established foraging and commuting flight pathways (Rowse <i>et al.</i> 2015; Stone 2013).	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term (disturbance) Medium-term (habitat loss and fragmentation) Permanent (loss of roost) - Extent: Local to county geographic scale
Whiskered bat	County importance	Less common bat species with a more restricted distribution. The majority of records were concentrated in Counties Tipperary and Offaly (Figure 3k in Appendix A8.9: Bat Surveys Report).	- Habitat loss and fragmentation - Loss of bat roost habitat - Mortality or injury to bats - Disturbance/displacement	- Whiskered bat is an uncommon species of bat in Ireland. Only a very few confirmed whiskered bat roosts have been found in the country. Two whiskered bat roosts were identified within the study area during the surveys. Both roosts are located outside the Proposed Project and would not be directly impacted or lost. The construction works would result, however, in the loss of suitable foraging and commuting habitat located in close proximity to the two roosts which would result in a negative impact on the bats within the roosts - Bat Conservation Ireland data indicate one other roost is located within a 2km buffer zone of the Proposed Project; however, this roost is located outside of the Proposed Project (820m away). No known whiskered bat roost would be directly impacted or lost as a result of construction of the Proposed Project - This species forages along woodland tracks, particularly near water. The construction of the RWI&PS at Parteen Basin could directly impact potential foraging grounds for this species. Without appropriate mitigation measures in place, habitat fragmentation due to the removal of hedgerows and treelines could also cause short-term significant effects for this species - Light and noise pollution and an increase in human activity during the construction of the Proposed Project could potentially cause Whiskered Bat to delay emergence from, or abandon, their roosts. Light and noise pollution and an increase in human activity could also negatively affect their foraging behaviour through avoidance or abandonment of established foraging and commuting flight pathways (Rowse <i>et al.</i> 2015; Stone 2013).	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term (disturbance) Medium-term (habitat loss and fragmentation) - Extent: Local to county geographic scale
Nathusius' pipistrelle	Local importance (higher value) – Annex IV of Habitats Directive and Wildlife Acts	Infrequently recorded along the Proposed Project (Figure 3h in Appendix A8.9: Bat Surveys Report).	- Habitat loss and fragmentation - Loss of bat roost habitat - Mortality or injury to bats - Disturbance/displacement	- Nathusius' pipistrelle individuals have been recorded in a number of counties throughout Ireland and some small roosts have been found; however, there are no records of maternity roosts for this species in the Republic of Ireland (BCIreland 2017). On the island of Ireland, breeding colonies of this species have only been recorded in Northern Ireland, in close proximity to Lough Neagh and Lough Erne (BCIreland 2017; Russ <i>et al.</i> 1998). This species usually roosts in wall cracks and crevices or in tree hollows, and maternity roosts are found in building walls. No confirmed Nathusius' pipistrelle roosts were recorded within the study areas during surveys. The species is commonly found roosting and foraging near large water bodies. Without appropriate mitigation measures in place, the construction of the RWI&PS at Parteen Basin could potentially have short-term significant effects for this species through disturbance of foraging grounds - Bat Conservation Ireland data indicate no known roosts are located within a 2km buffer zone of the Proposed Project for this bat species - Light and noise pollution and an increase in human activity could also negatively affect their foraging behaviour through avoidance or abandonment of established foraging and commuting flight pathways (Rowse <i>et al.</i> 2015; Stone 2013).	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term (disturbance) Medium-term (habitat loss and fragmentation) - Extent: Local to county geographic scale

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
Brown long-eared bat	Local importance (higher value) – Annex IV of Habitats Directive and Wildlife Acts	Less common but widely distributed throughout the Proposed Project. Tend to be recorded along woodland or treeline habitats (Figure 3m in Appendix A8.9: Bat Surveys Report).	- Habitat loss and fragmentation - Loss of bat roost habitat - Loss of roost - Mortality or injury to bats - Disturbance/displacement	- Six brown long-eared bat roosts were confirmed within the study area during surveys. Five of the six roosts are located outside the Proposed Project and would not be directly impacted or lost by the proposed construction works. The construction works however would result in the loss of one tree roost as well as suitable foraging and commuting habitat located in close proximity to the five remaining roosts which would result in a slight negative impact on the bats within the roosts - Bat Conservation Ireland data indicate four other roosts are located within a 2km buffer zone of the Proposed Project; however, all of these are outside of the Proposed Project (the closest being 520m away). No known brown long-eared bat roost would be directly impacted or lost as a result of construction of the Proposed Project - This species uses woodland, treelines and mature hedgerows as commuting and foraging corridors. Without appropriate mitigation measures in place, this species is likely to be significantly negatively affected by habitat fragmentation due to the removal of linear features within the landscape. This fragmentation could also lead to a loss of insect prey available (Hallmann 2017), increasing the distances needed for foraging and therefore decreasing the amount of foraging time per night - Light and noise pollution and an increase in human activity during the construction of the Proposed Project could potentially cause brown long-eared bat to delay emergence from, or abandon, their roosts. Light and noise pollution and an increase in human activity could also negatively affect their foraging behaviour through avoidance or abandonment of established foraging and commuting flight pathways (Rowse <i>et al.</i> 2015; Stone 2013).	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term (disturbance) Medium-term (habitat loss and fragmentation) Permanent (loss of roost) - Extent: Local to county geographic scale
Lesser horseshoe bat	International importance – Annex II and IV of Habitats Directive and Wildlife Acts	Lesser horseshoe bat was only recorded once during the array of surveys and this was located north-west of Birdhill (Figure 3l in Appendix A8.9: Bat Surveys Report).	- Habitat loss and fragmentation - Loss of bat roost habitat - Loss of roost - Mortality or injury to bats - Disturbance/displacement	- The lesser horseshoe is listed under Annex II and Annex IV of the Habitats Directive. One night roost, within a derelict building, was recorded inside the Proposed Project during the surveys. The proposed construction works would result in the removal of the building and loss of the roost which would result in a negative impact. The proposed construction works would also result in the loss of foraging and commuting habitat located adjacent to the roost. The roost, however, is located outside the principal territory for this species - Bat Conservation Ireland data indicate no known roosts are located within a 2km buffer zone of the Proposed Project for this bat species - Light and noise pollution and an increase in human activity during the construction of the Proposed Project could potentially cause lesser horseshoe bat to delay emergence from, or abandon, their roosts. The lesser horseshoe bat is particularly sensitive to light (NPWS 2018b). Light and noise pollution and an increase in human activity could also negatively affect their foraging behaviour through avoidance or abandonment of established foraging and commuting flight pathways (Rowse <i>et al.</i> 2015; Stone 2013).	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term (disturbance) Medium-term (habitat loss and fragmentation) Permanent (loss of roost) - Extent: Local to county geographic scale

8.5.2.3 Mammals – Eurasian Badger

8.5.2.3.1 Loss of Breeding/Resting Sites

647. A total of 47 setts (Table 8.36) were recorded within the Proposed Project. Of the 47, the Construction Phase would result in a direct permanent loss of 33 badger setts. Setts which were recorded along the boundary of the Proposed Project or within areas associated with power connection works would not be impacted/removed. Of the 33 badger setts (18 active and 15 inactive) two were considered main setts, thus the Proposed Project would affect two badger groups.

648. The construction works also have the potential to result in the collapse of setts due to significant vibrations associated with the works, which have the potential to result in the loss of setts and in some cases, the direct mortality of badgers. As outlined in Chapter 6 (Noise & Vibration), vibration impacts are typically limited to the sheet and cast concrete piling works as well as the trenchless crossings. 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. 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. Setts which are already proposed to be closed/destroyed to facilitate the Proposed Project were not considered. Four setts were found to occur within the Zol of vibrations and are listed below:

- One sett at Chainage TWA – 27300 potentially affected by piling location at Breaghmore, County Offaly
- One sett at Chainage TWD – 21900 potentially affected by piling location at Timahoe East, County Kildare
- One sett at Chainage TWD – 26800 potentially affected by piling location at Giltown Bog
- One sett at Chainage TWB – 12600 potentially affected by the trenchless crossing.

649. Two setts were determined to be outlier setts and inactive at the time of the surveys, one sett was an active subsidiary sett, while the fourth sett was a main active sett. Vibrations impacts were considered unlikely outside of the 15m buffer as vibration energy levels dissipate significantly with distance as a result of geometrical spreading of the vibration energy and its dissipation by soil viscosity and/or friction.

650. The significance of sett loss in relation to any badger group is based upon consideration of the type of sett, its importance to the badger group, and the availability of either alternative setts for affected badgers to relocate to, or the availability of alternative suitable sett building habitat within the territory. Sett loss may also lead to increased conflict with neighbouring badger groups if alternatives, in the form of existing setts or suitable habitat to construct setts, are not available within the existing territory. The abundance of alternative suitable sett building habitat within the study area was considered; however, given the scale of the Proposed Project and the number of permanent sett losses, it is predicted there is a potential for short-term (until suitable breeding habitat is reinstated), likely significant negative effects on badgers, at the local geographic scale.

8.5.2.3.2 Foraging Habitat Loss/Habitat Fragmentation

651. The use of temporary fencing during construction around boundaries and environmentally sensitive areas (Chapter 5: Construction & Commissioning) has the potential to separate badgers from a portion of their territory and reduce the amount of available habitat for foraging and may result in a short-term severance of badger territories. However, considering the availability of suitable habitat within the

surrounding area within the badger territories, there are no likely significant negative effects on badger foraging habitat, at any geographic scale.

8.5.2.3.3 Disturbance/Displacement

652. 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 disturb/displace badgers from both breeding/resting places and from foraging habitat. The 166 setts located within the Zol of the Proposed Project (i.e. setts located within 30m and 50m of the Proposed Project boundary and setts located within 150m of pile driving activities) may be subject to temporary disturbance/displacement effects as a result of noise and vibration associated with construction activities. Any disturbance/displacement impact is likely to be more significant during the badger breeding season (December to June inclusive) if the sett is in use at that time. If undertaken during the breeding season, this could result in the displacement of badgers from occupied setts, potentially affecting breeding success. On a precautionary basis, disturbance/displacement effects during construction have the potential to temporarily affect badger groups/populations and could result in a likely significant negative effect, at a local geographic scale.

8.5.2.3.4 Mortality Risk

653. Potential direct impacts could include risk of mortality or injury associated with construction activities; especially should night-time works be conducted. However, considering the national population of badger, which is estimated to range between 90,000 and 200,500 (Smal 1995; DAFM 2021), and given the highly mobile nature of the species, there are no likely significant negative effects as a result of mortality or injury, at any geographic scale.

8.5.2.3.5 Eurasian Badger – Summary of Effects During Construction

654. Table 8.60 summarises the potential Construction Phase impacts and associated effects on badgers. In the absence of mitigation measures there is potential for significant effects.

Table 8.60: Summary of Pre-Mitigation Effects Upon Badger During Construction of the Proposed Project

Key Ecological Receptor	Evaluation	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Summary of Effects
Eurasian badger	Local importance (higher value)	Loss of setts located within the Proposed Project	- Loss of breeding/resting sites - Foraging habitat loss and fragmentation/displacement and/or damage - Disturbance impacts (noise, vibration, physical presence, night-time lighting) associated with construction activities and staff undertaking works - Mortality or injury associated with vegetation removal and construction activities.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local geographic scale
		Habitat loss/habitat fragmentation		No likely significant effect at any geographic scale
		Disturbance/displacement		- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Temporary - Extent: Local geographic scale
		Risk of mortality		No likely significant effect at any geographic scale

8.5.2.4 Mammals – Otter

8.5.2.4.1 *Loss of Breeding/Resting Sites*

655. In total, three otter holts were recorded within the Proposed Project. Two holts were recorded as active, while the other was recorded as inactive. In addition, signs of otter presence were recorded within the study area and in the wider surroundings along watercourses crossed by the Proposed Project.
656. The otter holt recorded at Chainage TW – 700 is located on the southern boundary of the Proposed Project, on the bank of the Incha Beg River. Open trench works to install the pipeline are located in close proximity to the otter holt, however no construction works are proposed at the holt location, thus there will be no requirement to destroy the otter holt.
657. The otter holt recorded at Chainage TWA – 13000 is located on the bank of the Little Brosna River, in an area where trenchless construction is proposed. Therefore, there will be no loss of riparian habitat at the river crossing, and thus no requirement to destroy the otter holt.
658. The otter holt recorded at Chainage TWB – 24800 on the bank of the Clodiagh River, is similarly located in an area where trenchless construction is proposed. Therefore, there will be no loss of riparian habitat at the river crossing, and thus no requirement to destroy the otter holt.
659. All three otter holts, although located within the confines of the Proposed Project, will not be destroyed to facilitate the construction works, but may be subject to a level of disturbance. Effects associated with the disturbance of the holts during the construction works are assessed in Section 8.5.2.4.3.

8.5.2.4.2 *Habitat Loss/Habitat Fragmentation*

660. Otter habitat is defined as a 10m zone of riparian habitat along a riverbank (NPWS 2009I). At Parteen Basin, the construction of the RWI&PS would result in the permanent loss of approximately 960m² of otter terrestrial habitat on the eastern shore of Parteen Basin and a temporary habitat disturbance (up to 12 months; Chapter 5 (Construction & Commissioning)) of approximately 0.6ha of otter aquatic habitat within Parteen Basin. 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 would, therefore, 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 is unlikely to affect the conservation status of the otter population, and thus, there are no likely significant negative effects, at any geographic scale.
661. In the case of open trench excavation at watercourse crossings, short-term habitat loss would occur at the proposed crossing points, both in-stream and along the riparian zone within the boundaries of the Proposed Project. Habitat losses, in the context of the in-stream and riparian habitat resource in all surface water catchments crossed by the Proposed Project which support otter, would not constitute a significant decline in the extent of available otter habitat and would not affect the local otter population's ability to maintain itself, even in the short-term. Habitat loss associated with the construction of the Proposed Project is unlikely to affect the conservation status of the otter population, and thus, there are no likely significant negative effects, at any geographic scale.

662. The use of temporary fencing during construction around boundaries and environmentally sensitive areas (Chapter 5: Construction & Commissioning) has the potential to temporarily separate otters from a portion of their territory and reduce the amount of available habitat for foraging. However, habitats recorded within the Proposed Project suitable for otter are not uncommon in the wider surroundings, thereby limiting the potential for ecologically significant (negative) effects associated with habitat loss and/or habitat fragmentation. Infrastructure associated with the RWI&PS has the potential to cause a barrier to the movement of otter along the shore of Parteen Basin during the Construction Phase. Construction of the RWI would likely be completed within a 26-month period from site clearance to demobilisation, therefore any barrier effect created is unlikely to affect the conservation status of the otter population, and thus, there are no likely significant negative effects, at any geographic scale.

8.5.2.4.3 Disturbance/Displacement

663. As construction works would typically be undertaken during normal daylight working hours (an exception being trenchless crossings which may need to continue at night) and otter are generally nocturnal in habit, and given that otter can (in many circumstances) tolerate high levels of human presence and disturbance, displacement of otter from their habitat is unlikely to significantly affect the local otter population. However, there are 12 otter holts (including both active and inactive holts) located outside of the Proposed Project but within the wider study area. Of these, four (i.e. active non-breeding holts within 20m of works that involve tracked vehicles or active breeding holts within 150m of the Proposed Project) may be subject to temporary disturbance/displacement effects as a result of noise and vibration associated with construction activities (refer to the Environmental Masterplan in Figure 4.106 to Figure 4.184). Any disturbance/displacement impact is likely to be more significant during the otter breeding season (spring or early summer) if the holt is in use at that time. If undertaken during the breeding season, this could result in the displacement of otter from occupied holts, potentially affecting breeding success. On a precautionary basis, disturbance/displacement impacts during construction have the potential to affect the conservation status of local otter groups/populations, and therefore result in temporary, likely significant negative effects, at a local geographic scale.

8.5.2.4.4 Water Quality Impacts

664. A potential reduction in water quality (Chapter 9: Water) at Parteen Basin and/or at the watercourse crossings (e.g. through an increase in suspended solids or the introduction of pollutants) and any associated loss of aquatic biota (Section 8.5.3), may indirectly affect otter through a loss of available food resources (i.e. aquatic prey). On a precautionary basis, water quality impacts during construction have the potential to affect the conservation status of local otter groups/populations, and therefore result in short-term, likely significant negative effects, at a local geographic scale.

8.5.2.4.5 Mortality Risk

665. Potential direct impacts could include risk of mortality or injury associated with construction activities, especially should night-time works be conducted. However, given that they are highly mobile species, site clearance is unlikely to result in a level of mortality that would affect the species' conservation status, and therefore there are no likely significant negative effects, at any geographic scale.

8.5.2.4.6 Otter – Summary of Effects During Construction

666. Table 8.61 summarises the potential Construction Phase impacts and associated effects on otter. In the absence of mitigation measures there is potential for significant effects.

Table 8.61: Summary of Pre-Mitigation Effects Upon Otter During Construction of the Proposed Project

Key Ecological Receptor	Evaluation	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
Otter	International	Disturbance of breeding/resting sites	- Disturbance of breeding/resting sites - Loss of riparian habitat and/or habitat degradation - Temporary physical obstructions in the water (where a watercourse is crossed by open trench rather than trenchless techniques) - Disturbance impacts (noise, vibration, physical presence, night-time lighting) associated with construction activities and staff undertaking works - Habitat degradation associated with water quality impacts - Mortality or injury associated with vegetation removal and construction activities.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Temporary - Extent: Local geographic scale
		Habitat loss/habitat fragmentation		No likely significant effect at any geographic scale
		Disturbance/displacement		- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Temporary - Extent: Local geographic scale
		Water quality impacts		- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local geographic scale
		Mortality risk		No likely significant effect at any geographic scale

8.5.2.5 Mammals – Other Mammals Species

667. Other mammal species (i.e. Irish hare, pine marten, fallow deer, red squirrel, hedgehog) were infrequently recorded within the study area (Section 8.3.2.5). It is considered likely that these species regularly occur and are widely distributed throughout the Proposed Project.

8.5.2.5.1 Habitat loss / Habitat Fragmentation

668. Construction would result in the permanent loss of mammal habitat within the boundary of the Proposed Project. Given the relatively low numbers of other mammal species (e.g. Irish hare, pine marten, fallow deer, red squirrel, hedgehog) that were recorded during surveys, or evidence of same, it is likely that the study area does not support significant populations of these protected mammal species. Therefore, considering the low numbers recorded, their mobile nature and the abundance of alternative suitable habitat available locally, the impacts associated with habitat loss due to construction works are unlikely to affect the long-term viability of their local populations, and thus there are no likely significant negative effects, at any geographic scale.

669. The use of temporary fencing during construction around boundaries and environmentally sensitive areas (Chapter 5: Construction & Commissioning) has the potential to temporarily separate mammals from a portion of their territory and reduce the amount of available habitat for foraging. However, habitats recorded within the Proposed Project suitable for mammals are not uncommon in the wider surroundings, thereby reducing the potential for impacts associated with habitat fragmentation; thus, there are no likely significant negative effects, at any geographic scale.

8.5.2.5.2 Disturbance/Displacement

670. 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 disturb/displace mammal species from both breeding/resting places and from foraging habitat. However, as disturbance would be temporary it is very unlikely to result in any long-term effects on the local mammal population. Therefore, disturbance/displacement during construction is not predicted to result in likely significant negative effects on the local populations of other mammal species, at any geographic scale.

8.5.2.5.3 Mortality Risk

671. Site clearance work during the Construction Phase is unlikely to result in any significant mortality to the larger and more mobile species such as fallow deer and Irish hare. However, it is probable that vegetation clearance may result in some accidental mortality to the smaller species such as hedgehog, if present. It is anticipated the potential impact is likely to be greater during the breeding season when juveniles would be present in burrows (April–October), or in the case of hedgehog, impacts may be greater during their hibernation period which is November–March (inclusive). Despite this, mortality risk is not predicted to result in a likely significant negative effect on the local population of other mammal species, at any geographic scale.

8.5.2.5.4 Other Mammals – Summary of Effects During Construction

672. Table 8.62 summarises the potential Construction Phase impacts and associated effects on other mammals. There would be no likely significant effects.

Table 8.62: Summary of Pre-Mitigation Effects Upon Other Mammals During Construction of the Proposed Project

Key Ecological Receptor	Evaluation	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Summary of Effects
Other faunal species protected under the Wildlife Acts	Local importance (higher value)	Habitat loss/habitat fragmentation	Habitat loss and fragmentation/displacement and/or damage	No likely significant effect at any geographic scale
		Disturbance/displacement	Disturbance impacts (noise, vibration, physical presence, night-time lighting) associated with construction activities and staff undertaking works	No likely significant effect at any geographic scale
		Risk of mortality	Mortality or injury associated with vegetation removal and construction activities.	No likely significant effect at any geographic scale

8.5.2.6 Invertebrates

8.5.2.6.1 Lepidoptera

8.5.2.6.1.1 Habitat Loss/Habitat Fragmentation

673. Known marsh fritillary sites identified during the desktop study were avoided during the route selection process and typical habitats of marsh fritillary (wetlands used for breeding and feeding, calcareous grassland, fens, bogs, and upland heaths and grasslands) were also generally avoided by the Proposed Project. However, this species has been recorded within the Proposed Project (Section 8.3.2.6.2), therefore the Proposed Project would likely result in both the temporary (approximately 13.22ha) and permanent (approximately 3.4ha) loss of marsh fritillary typical habitat. Without appropriate mitigation measures in place, such an impact could affect the conservation status of marsh fritillary, and therefore result in a short-term, likely significant negative effect, at the local geographic scale.

8.5.2.6.1.2 Mortality Risk

674. A total of 49 webs were recorded within the ZOI of the Proposed Project. The proposed clearance of vegetation would likely result in direct mortality of the eggs, larvae and/or adults within these 49 webs, in the absence of mitigation. The magnitude of the impact would be dependent on the distribution of the species across the Proposed Project and the timing of the vegetation clearance. Without appropriate mitigation measures in place, such an impact could affect the conservation status of marsh fritillary, and therefore result in a short-term, likely significant negative effect, at a local geographic scale.

8.5.2.6.2 Molluscs

675. None of the three protected *Vertigo* species (Geyer's, Desmoulin's or narrow-mouthed whorl snail) were recorded in a survey of potentially suitable habitat undertaken in July 2020. The surveys confirmed four of the sites did not contain suitable habitat: Annaghmore, Pass and Derrinclare, County Offaly and Derrycree, County Kildare. Suitable habitat for Desmoulin's whorl snail and Geyer's whorl snail was found at Raheenduff, County Offaly, while suitable habitat for Desmoulin's whorl snail was found at Coolfin Glebe. Despite the presence of suitable habitat, however, the target species were not present. Based on the results of this survey, the Proposed Project would not impact on any populations of these three Annex II *Vertigo* species or their conservation status, thus there are no likely significant effects, at any geographic scale.

676. Lilljeborg's whorl snail, a rare whorl snail which was assessed in the Irish Red List as Vulnerable and brown snail, also assessed in the Irish Red List as Vulnerable, were both recorded at the RWI&PS site. The Proposed Project would result in the permanent loss of suitable habitat for these species and possible mortality of individuals within local populations. Without appropriate mitigation measures in place, there is a potential for a permanent, likely significant negative effect, at a county geographic scale.

8.5.2.6.3 Invertebrates – Summary of Effects During Construction

677. Table 8.63 summarises the potential Construction Phase impacts on invertebrates. In the absence of mitigation measures there is potential for significant effects on the marsh fritillary butterfly and Lilljeborg's whorl snail and brown snail.

Table 8.63: Summary of Pre-Mitigation Effects Upon Invertebrates During Construction of the Proposed Project

Key Ecological Receptor	Evaluation	Potential Construction Phase Impact(s)	Assessment of Potential Impacts	Summary of Effect
Marsh fritillary	International	- Habitat loss - Mortality risk	- Construction works would result in the temporary/permanent loss of suitable marsh fritillary and/or mollusc species habitat within the Proposed Project - Mortality or injury associated with vegetation removal and construction activities.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local geographic scale
Mollusc species (Lilljeborg's whorl snail and brown snail)	County	- Habitat loss - Mortality risk		- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent - Extent: County geographic scale

8.5.2.7 Other Species Groups

8.5.2.7.1 Reptiles and Amphibians

678. No reptiles (common lizard) were recorded within the study area during field surveys. Common frog and smooth newt were the only amphibian species recorded within the study area of the Proposed Project in wetland habitats. Although suitable habitats for these species and other amphibian species were generally avoided by the Proposed Project, there is potential for these species to be present at the time of construction in habitats such as water bodies or suitable damp grassland within the Proposed Project. Common frog and smooth newt are considered to be of local importance (higher value). Construction of the Proposed Project would result in the long-term or permanent loss of damp grassland habitats and the damming or fluming of watercourses. If this occurs during a period that coincides with the frog breeding season (February to April inclusive) or smooth newt breeding season (early spring), then frogs, newts and/or frog spawn or newt eggs could be present, resulting in the mortality of individuals within local populations. Without appropriate mitigation measures in place there is a potential for short-term, likely significant negative effects on common frog and smooth newt, at the local geographic scale.

8.5.2.7.2 Other Species Groups – Summary of Effects During Construction

679. Table 8.64 summarises the potential Construction Phase impacts and associated effects on reptiles and amphibians. In the absence of mitigation measures there is potential for significant effects on common frog and smooth newt.

Table 8.64: Summary of Pre-Mitigation Effects Upon Other Species Groups During Construction of the Proposed Project

Key Ecological Receptor	Evaluation	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
Common frog	Local importance (higher value)	- Habitat loss - Mortality risk	- Construction works would result in the long-term or permanent loss of damp grassland habitats within the Proposed Project - If habitat loss occurs during frog breeding season (February to April inclusive) then frogs and/or frog spawn could be present resulting in the mortality of individuals within local populations.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term (Construction Working Width) to Permanent (Infrastructure) - Extent: Local geographic scale
Smooth newt		- Habitat loss - Mortality risk	- Construction works would result in the long-term or permanent loss of bogs and grassland habitats within the Proposed Project - If habitat loss occurs during newt breeding season (early spring) then newts and/or newt eggs could be present resulting in the mortality of individuals within local populations.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term (Construction Working Width) to Permanent (Infrastructure) - Extent: Local geographic scale

8.5.3 Aquatic Ecology

680. This section describes and assesses the potential for the Proposed Project to result in likely significant effects on aquatic ecology in the absence of mitigation, under the following headings:
- Aquatic Ecology
 - Aquatic Habitats and Plant Communities (Section 8.5.3.1)
 - Aquatic Macroinvertebrates (Section 8.5.3.2)
 - Protected Aquatic Species (Section 8.5.3.3)
 - Invasive Non-Native Aquatic Species and Pathogens (Section 8.5.3.4).
681. Similarly to other major infrastructure projects which include works within or across water bodies, there is a potential to have a negative effect on aquatic flora and fauna during the Construction Phase in the absence of control measures or mitigation.
682. The route of the Proposed Project has been carefully positioned to avoid water bodies and minimise the number of watercourse crossings, where practicable (Chapter 3: Consideration of Reasonable Alternatives), thereby limiting direct impacts on aquatic flora and fauna.
683. Similarly to the route selection process, the proposed location for the RWI&PS at Parteen Basin was also carefully selected by carrying out a multi-criteria analysis of the potential impacts on environmental criteria such as Annex I habitats, local importance (higher value) habitats, Annex II Species and flora and fauna protected under the Wildlife Acts, for each of the potential sites (Jacobs/Tobin 2016). A hydrological model and a water quality model of Lough Derg and Parteen Basin were also 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 Appendix A9.1 Annex A (Hydrological Modelling Report) and Appendix A9.1 Annex B (Water Quality Modelling Report) and potential effects associated with water abstraction during the Operational Phase are assessed in Section 8.7.1.1.2 and Section 8.7.3.1.3.
684. As described in Chapter 5 (Construction & Commissioning), the proposed construction works potentially affecting aquatic flora and fauna include the following:
- At the RWI&PS: the installation of the Intake Chamber and concrete revetment mats. The boundary of the Intake Chamber and the Raw Water Pumping Station Building substructure would be created by secant pile construction along the shoreline of Parteen Basin
 - Along the Treated Water Pipeline the two approaches to watercourse crossings are trenchless or open-cut (construction activities associated with each of these techniques are described in Chapter 5 (Construction & Commissioning):
 - Using the trenchless construction technique, there would be no likely significant negative effects on the geomorphology, hydrology, or flood risk of the watercourse being crossed. These effects are therefore avoided
 - Using either the open-cut damming and fluming method or the open-cut damming and over-pumping method, it would be necessary to temporarily remove, using electrofishing equipment and trapping, fish and white-clawed crayfish from the reaches involved prior to dewatering, under Section 14 Authorisation.
685. No in-stream works are proposed as part of the proposed 38 kV Uprate Works, therefore no direct impacts, such as direct habitat loss or creation of barriers to migration for aquatic fauna would occur. Indirect impacts on aquatic fauna could arise if sediments or pollutants associated with the proposed 38 kV Uprate Works were released into catchments during the Construction Phase.

686. There are no surface water features of ecological importance 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_170 (SC: 09_1131; Lucan Stream) which is located approximately 610m north-east of the site at its closest point.

8.5.3.1 Aquatic Habitat and Plant Communities

8.5.3.1.1 *Habitat Loss*

687. The design of the RWI&PS requires the inlet structure to be constructed on the banks of Parteen Basin (Chapter 5: Construction & Commissioning). In order to accommodate the installation of the RWI&PS, excavation of approximately 15m below ground level is required for the main Raw Water Pumping Station Building substructure. The construction techniques that would be employed would be piling and excavation. The boundary of the structure would be constructed by secant piles to minimise the extent of excavation. 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. 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. These works 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. Therefore, habitat loss/fragmentation has the potential to result in a short-term, likely significant negative effect, at the international geographic scale.

688. There are no surface water features of ecological importance within or from the footprint of the WTP. However, 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. 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 River Shannon River SAC and a drainage ditch (WBP221) approximately 150m upstream of the Lower River Shannon SAC. It is proposed the access road would cross these watercourses by way of clear span bridges. The bridges would be constructed as a single span structure using precast concrete or steel sections such that there would not be any in-stream works required. The bridge abutments would be constructed at least 5m back from each bank of the watercourses. There are no steep gradients along the WTP access road. The first 200m to 250m of the proposed road 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.

689. The works for the watercourse crossings would lead to a loss of local riparian vegetation, potentially destabilising the banks. Impacts associated with habitat loss on these watercourses has the potential to result in a permanent, likely significant negative effect on aquatic habitats and plant communities occurring within the riparian habitat of WCX002, WBX004 and WBP221, at a local geographic scale.
690. In the case of open trench excavation at watercourse crossings, short-term habitat loss would occur at the proposed crossing points, both in-stream and along the riparian zone within the boundaries of the Proposed Project. These impacts would last for the duration of the Construction Phase (only short lengths of trench to be excavated at one time and each section of excavation is to be left open for as short a period of time as reasonably practicable) and are predicted to have short-term, likely significant negative effects on aquatic habitats and plant communities at a local to international geographic scale due to their hydrological connection to European sites (Table 8.65).
691. No in-stream habitat loss would occur at the trenchless crossings and launch and receptor pits will be located away from riparian vegetation. Considering the short-term and minor nature of these works, there are no likely significant negative effects, at any geographic scale (Table 8.65).
692. Construction of the outfall structures associated with the permanent discharges to watercourses from the Washout Valves (Section 8.7.1.1.3) has the potential to impact aquatic habitat and plant communities. In-stream/bankside habitat would be lost, or modified, as a result of construction works to install the outfall structures. The outfall structures would contain a stilling basin that would be used for both dechlorination and decelerating the discharge velocity to avoid any scour in the watercourse. Habitat losses of such a small scale, in the context of the in-stream and riparian habitat resource in all surface water catchments crossed by the Proposed Project, would not result in a likely significant negative effect on aquatic habitats and plant communities, at any geographic scale.
693. Once a watercourse crossing has been completed it would be necessary to maintain the movement of construction traffic along the wayleave. This would be done by the use of temporary bridges. Typically, these are modular flat-pack bridges (steel flooring panels) made specifically for this purpose. Alternatively, beam bridges or plate girder bridges may be used where longer spans are required to mitigate impacts on sensitive habitats (Chapter 5: Construction & Commissioning). Riparian corridors would be reinstated after the pipeline has been installed and the temporary bridges, needed to maintain the movement of construction traffic along the wayleave, are removed. As a worst-case scenario, it is assumed that all temporary works are in place for the duration of the Construction Phase, currently estimated to be five years. Therefore, it is expected that in the absence of mitigation these impacts could have short-term, likely significant negative effects on aquatic habitats and plant communities using or occurring within riparian habitats at watercourse crossings, at a local to international geographic scale due to their hydrological connection to European sites (Table 8.65).

8.5.3.1.2 Habitat Degradation as a Result of Suspended Solids Pollution

694. The construction of the Proposed Project may cause the pollution of water bodies within or near the Proposed Project as a result of increased suspended solids, as follows:
- Where the placing of a temporary piling platform occurs at the RWI&PS site in Parteen Basin to allow secant pile construction along the shoreline. The platform may be constructed using sheet piles in Parteen Basin to contain the platform
 - Where earthworks occur near water bodies within the Proposed Project, such as vegetation clearance, topsoil stripping, and storage of excavated materials, which all have the potential to create bare earth surfaces
 - Where the pipeline intersects a watercourse and excavation occurs in and around channels
 - Where temporary bridges are required to span watercourses and maintain the movement of construction traffic along the Construction Working Width

- Where trenchless crossings occur, there is potential for a 'breakout' of bentonite drilling fluid (see Section 8.5.1.1.2). This is, in effect, a slurry of very fine suspended solids. In practice there is very low probability of this occurring
- Where permanent hard surfaces are constructed at the infrastructure sites (potential surface water runoff)
- Where permanent drainage features are constructed at the infrastructure sites (potential changes to hydromorphology)
- Where outfalls are in the freshwater environment near Washout Valve locations there is the potential for silt-laden runoff during excavation of the outfall structure and potential for accidental spillage of oils/chemicals from machinery during the construction process
- Where access roads or Haul Roads are constructed close to, or would intersect watercourses, there is a potential for fine sediment or pollution to enter the watercourses.

695. Sediment-laden runoff from construction areas and introduction of fine sediments can pose negative impacts to aquatic life in watercourses resulting in the following potential effects:

- Reduction of visibility in the stream, impairing foraging ability for fish
- Settled sediments can smother and displace aquatic organisms such as macroinvertebrates, reducing the amount of food items available to fish
- Suspended solids particles can clog or damage the gills of salmonid fish
- The settlement of suspended solids particles on spawning areas can smother the eggs in the gravel
- Higher concentrations of suspended solids may also serve as a sink or carrier for toxins/chemicals
- Water with higher concentrations of solids impedes photosynthesis.

696. Increased suspended solids as a result of the construction of the Proposed Project, in the absence of mitigation, may affect the aquatic habitats and plant communities of Parteen Basin and the Old River Shannon and the receiving waters along the length of the Proposed Project. There are no surface water features of ecological significance within the footprint of the WTP, BPT, BPS, FCV, or TPR, therefore construction works at these sites would not have an effect on aquatic habitats and plant communities. An assessment of the potential effect on surface water quality is provided in Chapter 9 (Water). The ecological significance of potential suspended solids pollution in relation to aquatic habitats and plant communities is assessed in Table 8.65.

8.5.3.1.3 *Habitat Degradation as a Result of Pollution from Other Substances*

697. In the absence of control or mitigation measures, there is potential for pollution of water bodies with other substances such as oils, chemicals, and wastewater due to accidental spillage or surface water runoff which could directly or indirectly affect aquatic habitats and plant communities.

8.5.3.1.3.1 *Proposed 38 kV Uprate Works*

698. The proposed access tracks to each of the structures along the route of the 38 kV Uprate Works are shown in Figure 8.4 to Figure 8.10. In total, 12 access tracks cross surface water features (12 FW4) via a combination of existing bridges or temporary clear span bridges. The main potential negative impact associated with these crossings is a reduction in water quality through the potential introduction of pollution which could affect the aquatic environment and consequently aquatic fauna, within and downstream of the Proposed Project. In the absence of mitigation, the movement of plant/machinery over these surface water crossings and indeed the placement of clear span bridges (where required), could result in temporary, likely significant negative effects on water quality and associated aquatic species, at a local geographic scale.

8.5.3.1.3.2 Raw Water Intake and Pumping Station

699. An accidental discharge of oil from the barge or pontoon at Parteen Basin during the construction of the RWI, although unlikely, could have a negative effect on aquatic habitats and plant communities. Oil is an immiscible substance; it would initially float on the surface, leading to effects on amenity and surface dwelling flora and fauna. In the absence of any mitigation measures, i.e. removal, the oil would start to degrade and move down through the water column and negatively affect flora below the surface of the water. Parteen Basin is part of the Lower River Shannon SAC and so is of international importance. In the absence of mitigation, depending on the volumes concerned, potential impacts are considered have the potential to result in short-term, likely significant negative effects on aquatic habitats and plant communities, at the international geographic scale (i.e. the maximum ecological value for a designated European site) (Table 8.65).
700. An accidental discharge of chemicals into Parteen Basin would vary in magnitude, depending on the nature and scale of the pollution event. Given the size of Parteen Basin, chemical spills are likely to be diluted in the water column. In the absence of mitigation, depending on the volumes and contaminants concerned, potential impacts could result in short-term, likely significant negative effects on aquatic habitats and plant communities, at the international geographic scale (Table 8.65).
701. Surface water runoff generated as a result of rainfall at the proposed Raw Water Pumping Station Building has the potential, during the Construction Phase and in the absence of control and mitigation measures, to eventually discharge into Parteen Basin via overland flow or by infiltration to ground. A broad range of potential pollutants may be associated with such runoff, including hydrocarbons, fuel and fuel additives, and particulate contaminants. In the absence of mitigation, impacts on aquatic habitats and plant communities could result in temporary, likely significant negative effects, on the international geographic scale (Table 8.65).
702. The effects of any wastewater discharges from the barge in Parteen Basin are likely to be imperceptible, given the dilution capabilities of Parteen Basin, and thus there are no likely significant negative effects on aquatic habitats and plant communities, at any geographic scale (Table 8.65).

8.5.3.1.3.3 Construction Compounds and Pipe Storage Depots

703. The only known watercourses recorded within any of the Construction Compounds or Pipe Storage Depot sites with the potential to be impacted by the proposed works in these areas are unmapped drainage ditches which were recorded during field surveys between 2016 and 2024. The proposed Construction Compounds which contained unmapped drainage ditches are located in:
- Garrynatineel, County Tipperary within the RWI&PS site near Chainage RW – 0 (Figure 8.11)
 - Incha Beg, County Tipperary within the WTP site near Chainage RW – 2000 (Figure 8.12)
 - Coagh Upper, County Offaly within the BPS near Chainage TWB – 1250 (Figure 8.47)
 - Killananny, County Offaly near Chainage TWB – 18700 (Figure 8.62)
 - Drummond, County Kildare near Chainage TWD – 16500 (Figure 8.90)
 - Loughtown Upper, County Dublin within the TPR near Chainage TWE – 17500 (Figure 8.108).
704. The proposed Pipe Storage Depots that contained unmapped drainage ditches are located in:
- Carrigatogher, County Tipperary near Chainage TW – 12700 (Figure 8.19)
 - Fortel, County Offaly near Chainage TWA – 23300 (Figure 8.44)
 - Derrinboy, County Offaly near Chainage TWB – 7200 (Figure 8.56)
 - Derryweelan, County Offaly near Chainage TWC – 7300 (Figure 8.70)

- Baltracey, County Kildare near Chainage TWE – 150 (Figure 8.99)
 - Barberstown, County Kildare near Chainage TWE – 7500 (Figure 8.102).
705. There are also mapped watercourses flowing adjacent to or along the boundary of eight of the proposed Construction Compound or Pipe Storage Depot sites:
- Abbott Stream, a first-order watercourse in Carrigatogher Bog, County Tipperary (Chainage TW – 12600) (Figure 8.19)
 - Clareen Stream, a second-order watercourse in Fortel, County Offaly (Chainage TWA – 23200) (Figure 8.44)
 - Kyleboher Stream, a first-order watercourse and the Silver (Kilcormac), a third-order watercourse both present in Derrinboy, County Offaly (Chainage TWB – 7100) (Figure 8.56)
 - Clodiagh (Tullamore) River, a second-order watercourse in Killananny, County Offaly (Chainage TWB – 18700) (Figure 8.62)
 - Kilkeaskin Stream, a first-order watercourse in Drummond, County Kildare (Chainage TWD – 16200) (Figure 8.90)
 - Baltracey Stream a first-order watercourse in Baltracey, County Kildare (Chainage TWE – 150) (Figure 8.99).
706. There is potential for site disturbance during the setup and utilisation of Construction Compounds and Pipe Storage Depots to facilitate the works. Construction Compounds and Pipe Storage Depots located close to watercourses have the potential to impact stream/river riparian corridors and alter surface water attenuation and flow paths. Vehicle movements, refuelling etc., can all create potential for spillages and leakage which may enter nearby watercourses. All of the above listed watercourses have been evaluated as medium or low ecological value and are therefore considered to be between local (higher value) and county importance (Table 8.52). Depending on the volumes and contaminants concerned, potential impacts could result in short-term, likely significant negative effects, at a local to county geographic scale (Table 8.65).
707. The construction and utilisation of Construction Compounds during the Construction Phase would require the removal of wastewater from toilets and domestic water from washing facilities, which would require treatment and safe disposal to a suitable location. Inadequate treatment of on-site toilets and washing facilities could cause faecal contamination in nearby water bodies, potentially affecting aquatic ecology. Foul water arising from toilets, washrooms, shower and canteen facilities during the Construction Phase would be collected and discharged to a storage tank which would be emptied by a suction tanker periodically to the nearest Wastewater Treatment Plant (WwTP). Therefore, there are no likely significant negative effects on aquatic habitats or plant communities associated with wastewater disposal from the Construction Compounds, at any geographic scale (Table 8.65).

8.5.3.1.3.4 Treated Water Pipeline

708. Construction works at each watercourse crossing along the Treated Water Pipeline have the potential to directly or indirectly impact the aquatic habitats and plant communities in receiving waters (i.e. at the crossing points and downstream of the Proposed Project). As mentioned, watercourse crossings would be facilitated by one of two methods: trenchless or open trench techniques.
709. Trenchless construction avoids cutting into and reinstating valuable assets or amenity and is preferable where there is environmental and/or technical justification. Trenchless construction would be employed at thirteen major watercourse crossings and/or watercourses considered to be of high freshwater ecological value (Appendix A8.14: Watercourse Crossing Data); however, the majority of watercourses would be crossed by simpler construction techniques involving open trench excavation.

710. In the case of open trench excavation, as mentioned, there are two approaches identified: fluming and over-pumping. Both techniques require watercourses to be dammed. 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 aquatic habitats and plant communities. Further details on the potential impacts on water quality are addressed in Chapter 9 (Water). An assessment of the potential effects on aquatic habitats and plant communities is provided in Table 8.65.
711. To maintain the unhindered flow of construction traffic from one part of the works to another, temporary bridges would be deployed to span watercourses and maintain the movement of construction traffic along the Construction Working Width. These would only be retained for the duration of the construction of the Proposed Project. Different designs and construction methods would be used depending on factors such as the watercourse being crossed (width, sensitivity) and the vehicles that would need to cross the structure. The main potential negative impact associated with these crossings is a reduction in water quality through the potential introduction of pollution which could affect the aquatic environment and consequently aquatic fauna, within and downstream of the Proposed Project. In the absence of mitigation, the movement of plant/machinery over these surface water crossings and indeed the placement of temporary bridges (where required), are predicted to result in temporary, likely significant negative effects on water quality and associated aquatic species, at the local geographic scale.
712. Construction of the outfall structures associated with the permanent discharges to watercourses from the Washout Valves has the potential for accidental spillage of oils/chemicals from machinery during the construction process. This could result in the reduction in water quality and pollution, which could pose negative impacts to aquatic habitats and plant communities. An assessment of the potential effects on aquatic habitats and plant communities is provided in Table 8.65.
713. During the commissioning of the pipeline, Washout Valves would be used for removing silt and sediment which could have accumulated during the construction process. In addition, the commissioning process would include water quality testing along lengths of the pipeline and the chlorination of the pipe. If there was a failure in a section of the pipe, the water contained in that section would need to be disposed of. The discharge point would be the nearest Washout Valve. The water would be dechlorinated as necessary by the use of an intermediate chamber at each Washout Valve or permanent outfall structure. A mobile treatment unit such as a 'Siltbuster' or similar would be used for solids removal (during commissioning only). As a result, there would be no effects on the water quality of the receiving watercourses during testing and commissioning of the pipeline, following implementation of design requirements to control discharges from Washout Valves.

8.5.3.1.4 Habitat Degradation as a Result of Hydrological Impacts

714. As discussed in Section 8.5.1.1.3, during the pipeline test and commissioning sequence, hydrostatic pressure testing will be required (Appendix A5.2: Commissioning Strategy). The abstraction of raw water from watercourses close to the pipeline, and discharge post testing, as a worst-case scenario, is assessed herein in relation to biodiversity. 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 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 (see Table 8.78 and Table 8.79). In addition, Washout Valves at Line Valves would 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 will be released via one of these 20 Line Valve Washouts. These are detailed in Annex F in Appendix A5.2 (Commissioning Strategy).

715. In the absence of mitigation measures, the abstraction of water for testing and commissioning and discharge post testing, could lead to habitat degradation of aquatic habitats and plant communities as a result of lowering of water levels, scouring, flooding, and/or degraded water quality, and thus there is a potential for short-term, likely significant negative effects on aquatic habitats and plant communities within these watercourses, on a local to international geographic scale (Table 8.65).
716. Permanent infrastructure for the Washout Valves would consist of a suitable length of pipeline, valving to control discharge of drain water, a Washout Valve chamber, and outfall structure. Construction of the outfall structure has the potential to impact on the water body and aquatic habitat and plant communities. There is potential for changes in hydrological flow as a result of channelisation/modification of the water body, excavation of the riverbanks, or changes in water levels due to dewatering of excavations or changes in drainage. All permanent outfalls are located on relatively large water bodies, large enough to install the outfall structure, which would be sized in proportion to the water body banks. The majority of watercourses which would have permanent Washout Valves installed are at the locations of open trench crossings, while seven would be installed at the locations of trenchless crossings and three would be installed along points where the Proposed Project runs adjacent to a watercourse but does not cross it. Thus, potential impacts could result in short-term, likely significant negative effects, at a local to international geographic scale (Table 8.65).

8.5.3.2 Aquatic Macroinvertebrates

717. The only protected macroinvertebrate recorded in the study area was white-clawed crayfish. This species was only recorded on six occasions during surveys undertaken between 2016 and 2024 but is likely to occur in several watercourses crossed by the Proposed Project, where suitable habitat exists. Potential impacts on white-clawed crayfish as a result of the Proposed Project are considered in Section 8.5.3.3.

8.5.3.3 Protected Aquatic Species

8.5.3.3.1 Habitat Loss

718. As mentioned, the design of the RWI&PS requires the inlet structure to be constructed on the banks of Parteen Basin. In order to accommodate the installation of the RWI&PS, excavation of approximately 15m below ground level is required for the main Raw Water Pumping Station Building substructure. 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. 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. These works would result in the removal of a section of the existing bank around Parteen Basin and temporary disturbance to the bed of the basin. Parteen Basin is located within the Lower River Shannon SAC. Although none of the qualifying interests of the SAC were recorded within the proposed RWI&PS site during the baseline field studies, Parteen Basin has the potential to support a number of the species listed as features of interest (namely; freshwater pearl mussel, sea lamprey, brook lamprey, river lamprey, Atlantic salmon, and otter). The significance of impacts on protected aquatic species is assessed in Table 8.65.
719. In the case of open trench excavation at watercourse crossings, short-term habitat loss would occur at the proposed crossing points, both in-stream and along the riparian zone within the boundaries of the Proposed Project. In-stream works may impact directly on aquatic habitats such as spawning or nursery gravels for fish. It is expected that in the absence of mitigation these impacts could have short-term, likely significant negative effects on protected aquatic species, on a county geographic scale (Table 8.65).

720. No in-stream habitat loss would occur at the trenchless crossings, therefore there are no likely significant negative effects on protected aquatic species, at any geographic scale.
721. Construction of the outfall structures associated with the permanent discharges to watercourses from the Washout Valves, has the potential to result in the loss or degradation of aquatic habitat which could impact protected aquatic species. In-stream gravel provides a habitat for many aquatic species at different stages of their life cycle. Certain fish species including salmon and lamprey excavate gravel to create what is referred to as a 'redd' where they deposit their eggs/ova. These spawning gravels could be impacted by physical disturbance (i.e. impacts on the flow regime within the watercourse from outfall and scour protection) and input of sediments. Physical disturbance can destroy eggs, and sediment can block spaces between the gravel particles reducing water flow through the redd, thereby limiting the dissolved oxygen available to the developing eggs. The majority of watercourses which would have permanent Washout Valves installed are at the location of open trench crossings, while seven would be installed at the location of trenchless crossings and three would be installed along watercourses that will not be crossed by the Proposed Project. Potential impacts associated with the construction of the outfall structures and Washout Valves could result in short-term, likely significant negative effects on aquatic species, at a local to international geographic scale (Table 8.65).

8.5.3.3.2 *Habitat Degradation as a Result of Suspended Solids Pollution*

722. Increased suspended solids as a result of the construction of the Proposed Project, in the absence of mitigation, may affect the protected aquatic species of Parteen Basin and the Old River Shannon and the receiving waters along the length of the Proposed Project. There are no surface water features of ecological significance within the footprint of the WTP, BPT, BPS, FCV, or TPR, therefore construction works at these sites would not have an effect on protected aquatic species. An assessment of the potential effect on surface water quality is provided in Chapter 9 (Water). The ecological significance of potential suspended solids pollution in relation to protected aquatic species is assessed in Table 8.65.

8.5.3.3.3 *Habitat Degradation as a Result of Pollution from Other Substances*

723. In the absence of control or mitigation measures, there is potential for pollution of water bodies with other substances such as oils, chemicals, and wastewater due to accidental spillage or surface water runoff which could directly or indirectly affect aquatic fauna.

8.5.3.3.3.1 *Raw Water Intake and Pumping Station*

724. An accidental discharge of oil from the barge or pontoon at Parteen Basin during the construction of the RWI, although unlikely, could have a negative effect on protected aquatic species. Oil is an immiscible substance; it would initially float on the surface, leading to effects on amenity and surface-dwelling fauna. In the absence of any mitigation measures, i.e. removal, the oil would start to degrade and move down through the water column and negatively affect fauna below the surface of the water. Parteen Basin is part of the Lower River Shannon SAC and so is of international importance. In the absence of mitigation, depending on the volumes concerned, potential impacts could result in short-term, likely significant negative effects on aquatic fauna, at the international geographic scale (i.e. the maximum ecological value for a designated European site) (Table 8.65).
725. An accidental discharge of chemicals into Parteen Basin would vary in magnitude, depending on the nature and scale of the pollution event. Given the size of Parteen Basin, chemicals spills are likely to be diluted in the water column. In the absence of mitigation, depending on the volumes and contaminants concerned, potential impacts could result in short-term, likely significant negative effects on aquatic fauna, at the international geographic scale (Table 8.65).

726. Surface water runoff generated as a result of rainfall at the RWI&PS has the potential, during the Construction Phase and in the absence of control and mitigation measures, to eventually discharge into Parteen Basin via overland flow or by infiltration to ground. A broad range of potential pollutants may be associated with such runoff, including hydrocarbons, fuel and fuel additives, and particulate contaminants. In the absence of mitigation, impacts on protected aquatic fauna could result in short-term, likely significant negative effects, at the international geographic scale (Table 8.65).
727. The effects of any wastewater discharges from the barge in Parteen Basin are likely to be imperceptible, given the dilution capabilities of Parteen Basin, and thus there are no likely significant negative effects on protected aquatic fauna, at any geographic scale (Table 8.65).

8.5.3.3.2 Construction Compounds and Pipe Storage Depots

728. Construction Compounds and Pipe Storage Depots located close to watercourses have the potential to impact stream/river riparian corridors, and alter surface water attenuation and flow paths. These watercourses have been evaluated as low or medium ecological value and are therefore considered to be between local (higher value) and county importance. Vehicle movements, refuelling etc., can all create potential for spillages and leakage which may enter nearby watercourses. Depending on the volumes and contaminants concerned, in a worst-case scenario, potential impacts on protected aquatic species could have short-term, likely significant negative effects, at a local to county geographic scale (Table 8.65).
729. The construction and utilisation of Construction Compounds during the Construction Phase would require the removal of wastewater from toilets and domestic water from washing facilities, which would require treatment and safe disposal to a suitable location. Inadequate treatment of on-site toilets and washing facilities could cause faecal contamination in nearby water bodies, potentially affecting aquatic ecology. Foul water arising from toilets, washrooms, shower and canteen facilities during the Construction Phase would be collected and discharged to a storage tank which would be emptied by a suction tanker periodically to the nearest WwTP. Therefore, there are no likely significant negative effects on protected aquatic fauna associated with wastewater disposal from the Construction Compounds, at any geographic scale (Table 8.65).

8.5.3.3.3 Treated Water Pipeline

730. Construction works at each watercourse crossing along the Treated Water Pipeline have the potential to directly or indirectly impact the protected aquatic fauna in receiving waters (i.e. at the crossing points and downstream of the Proposed Project). As mentioned, watercourse crossings would be facilitated by one of two methods: trenchless or open trench techniques.
731. Trenchless construction avoids cutting into and reinstating valuable assets or amenity and is preferable where there is environmental and/or technical justification. Trenchless construction would be employed at 13 major watercourse crossings and/or watercourses considered to be of high freshwater ecological value (Appendix A8.14: Watercourse Crossing Data); however, the majority of watercourses would be crossed by simpler construction techniques involving open trench excavation.
732. In the case of open trench excavation, as mentioned, there are two approaches identified: fluming and over-pumping. Both techniques require watercourses to be dammed. 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 protected aquatic fauna. Further details on the potential impacts on surface water quality are addressed in Chapter 9 (Water). An assessment of the potential effects on protected aquatic fauna is provided in Table 8.65.

8.5.3.3.4 *Habitat Degradation as a Result of Hydrological Impacts*

733. As discussed in Section 8.5.1.1.3, during the pipeline test and commissioning sequence, hydrostatic pressure testing would be required (Appendix A5.2: Commissioning Strategy). The abstraction of raw water from watercourses close to the pipeline, and discharge post testing, as a worst-case scenario, is assessed herein in relation to biodiversity. 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 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 (see Table 8.78 and Table 8.79). In addition, Washout Valves at Line Valves would 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 will be released via one of these 20 Line Valve Washouts. These are detailed in Annex F in Appendix A5.2 (Commissioning Strategy). In the absence of mitigation measures, the abstraction of water for testing and commissioning and discharge post testing could lead to habitat degradation as a result of lowering of water levels, scouring, flooding, and/or degraded water quality, and thus there is a potential for short-term, likely significant negative effects, on a local to international geographic scale (Table 8.65).
734. Permanent infrastructure for the Washout Valves would consist of a suitable length of pipeline, valving to control discharge of drain water, a Washout Valve chamber, and outfall structure. Construction of the outfall structure has the potential to impact on the water body and protected aquatic species. There is potential for changes in hydrological flow as a result of channelisation/modification of the water body, excavation of the riverbanks, or changes in water levels due to dewatering of excavations or changes in drainage. All permanent outfalls are located on relatively large water bodies, large enough to install the outfall structure, which would be sized in proportion to the water body banks. The majority of watercourses which would have permanent Washout Valves installed are at the location of open trench crossings, while seven would be installed at the location of trenchless crossings and three would be installed along watercourses that would not be crossed by the Proposed Project. Potential impacts could result in short-term, likely significant negative effects, at a local to international geographic scale (Table 8.65).

8.5.3.3.5 *Disturbance/Displacement*

735. Subacoustech Environmental Ltd. undertook underwater noise modelling of impact piling and vibratory piling in Parteen Basin (Appendix A8.20: Underwater Noise Modelling Report). As noted in Section 8.2.5.2.4, 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 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.
736. 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 (L_p) 48 hours) and temporary threshold shift (158 L_p 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.

737. 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.
738. 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. Thus, in the absence of mitigation, potential impacts associated with the vibropiling activities could result short-term, likely significant negative effects on aquatic species, at a local to international geographic scale.
739. Construction of the outfall structures associated with the permanent discharges to watercourses from the Washout Valves, has the potential to result in the physical disturbance of spawning gravels. Physical disturbance can destroy eggs, and sediment can block spaces between the gravel particles reducing water flow through the redd, thereby limiting the dissolved oxygen available to the developing eggs. The majority of watercourses which would have permanent Washout Valves installed are at the location of open trench crossings, while seven would be installed at the location of trenchless crossings and four would be installed along watercourses that will not be crossed by the Proposed Project. Potential impacts associated with the construction of the outfall structures and Washout Valves could result in short-term, likely significant negative effects on aquatic species, at a local to international geographic scale (Table 8.65).

8.5.3.3.6 Mortality Risk

740. During construction of the RWI&PS, there is a risk of construction materials accidentally falling into Parteen Basin and killing/injuring aquatic species such as Atlantic salmon and lamprey species. The construction of the RWI&PS introduces a risk of mortality from collisions with construction traffic/materials or materials falling into Parteen Basin, thus there is a potential for short-term, likely significant negative effects, at the local geographic scale.
741. No in-stream works are proposed for the trenchless crossing methods or for the 38 kV Uprate Works crossings. Therefore, the biggest risk of mortality from construction works is associated with open-cut crossings only (Appendix A8.14: Watercourse Crossing Data).
742. In the case of trenchless crossings, the launch and reception shafts would be situated outside of the riparian zone, 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 aquatic species; thus, there are no likely significant negative effects, at any geographic scale.

743. In the case of open-cut crossings, watercourses would be dammed and fish and white-clawed crayfish would be temporarily removed using electrofishing equipment and trapping 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, and lamprey ammocoetes. These impacts could result permanent, likely significant negative effects, at the local geographic scale.

8.5.3.4 Invasive Non-Native Aquatic Species and Pathogens

744. Crayfish plague (a microbial pathogen) is listed as one of the greatest INNS threats to Ireland's native white-clawed crayfish. Crayfish plague has been reported in a number of Irish watercourses (including the River Barrow and River Clodiagh) (NBDC 2019). If the disease were to become established in the River Shannon, the impact is likely to be severe and very likely uncontrollable, based on the experience elsewhere in Europe (NPWS 2023). The movement of construction equipment between watercourse catchments has the potential to spread this disease, i.e. equipment may be contaminated with disease propagules. 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 also has the potential to spread this disease. Without appropriate mitigation measures in place, this could impact the conservation status of white-clawed crayfish and result in long-term, likely significant negative effects, at the international geographic scale (Table 8.65).
745. Similarly, the movement of construction equipment between watercourse catchments, and the discharge of water following the completion of hydrostatic pressure testing, could also spread invasive non-native aquatic plants. Six invasive non-native aquatic plant species recorded in Lough Derg (Minchin & Boelens 2011) are 'Most Wanted' or 'Problematic' INNS according to the Invasive Species Ireland National Invasive Species Database (NBDC 2024b). Considered by the database to be 'Low' to 'Medium Risk' INNS, these are water fern, Canadian pondweed/waterweed, Nuttall's waterweed, water violet (*Hottonia palustris*), common duckweed (*Lemna minuta*), and water soldier. Without appropriate mitigation measures in place, the introduction or spread of invasive non-native aquatic plants could result in long-term, likely significant negative effects on native aquatic plants, on a local to international geographic scale (Table 8.65).
746. Zebra mussels are small, freshwater bivalve molluscs that attach to hard surfaces and form dense clusters. In this way they are able to build up into a significant structure. They are an INNS and are found to be present in the River Shannon catchment, including Lough Derg and Parteen Basin. Zebra mussel are an extremely aggressive invader, often dominating a water body and reducing the amount of food available for other organisms, including fish. Similarly, Asian clam are also known to aggressively out-compete native invertebrate communities, limit phytoplankton biomass, and alter benthic habitats. They are also found to be present in the River Shannon catchment, but studies did not reveal any Asian clams in Lower Lough Derg or Parteen Basin; however it is expected this species may arrive in Parteen Basin within the decade as a result of a gradual downstream natural expansion (Minchin 2016). In the absence of appropriate mitigation construction activities at the RWI&PS could cause the transfer and spread of INNS, including the aforementioned species, into other water bodies and catchments. Depending on the nature and scale of the potential transfer and spread of INNS and without appropriate mitigation measures in place, in a worst-case scenario this could result in long-term, likely significant negative effects on protected aquatic species, at the international geographic scale (Table 8.65).

8.5.3.5 Aquatic Ecology – Summary of Effects During Construction

747. Table 8.65 summarises the potential Construction Phase impacts and associated effects to aquatic fauna and flora as a result of the Proposed Project. In the absence of mitigation measures there is potential for likely significant effects.

Table 8.65: Summary of Pre-Mitigation Effects Upon Aquatic Flora and Fauna During Construction of the Proposed Project

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Summary of Effects
Parteen Basin (FL7)	International	RWI&PS site located at Parteen Basin in the townland of Garrynatineel, County Tipperary	• Habitat loss associated with the construction of the RWI&PS infrastructure • Habitat degradation and suspended solids associated with the placing of a temporary piling platform at the RWI&PS site in Parteen Basin to allow secant pile construction along the shoreline • Habitat degradation as a result of pollution associated with the accidental discharge of oil from a barge or pontoon • Habitat degradation as a result of the accidental spread of INNS • Disturbance associated with vibropiling activities.	Habitat loss: • Quality of effects: Negative • Significance: Significant effect • Probability: Likely • Duration: Short-term • Extent: International geographic scale
				Habitat degradation as a result of suspended solids: • Quality of effects: Negative • Significance: Significant effect • Probability: Likely • Duration: Short-term • Extent: International geographic scale
				Habitat degradation as a result of pollution: • Quality of effects: Negative • Significance: Significant effect • Probability: Likely • Duration: Short-term • Extent: International geographic scale
				Habitat degradation as a result of invasive species: • Quality of effects: Negative • Significance: Significant effect • Probability: Likely • Duration: Long-term • Extent: International geographic scale
				Disturbance as a result of vibropiling activities: • Quality of effects: Negative • Significance: Significant effect • Probability: Likely • Duration: Short-term • Extent: International geographic scale

Key Ecological Receptor	Evaluation	Area		Potential Construction Phase Impact(s)	Summary of Effects
Watercourses (FW1, FW2, FW3) ranked as being of 'high ecological value' (Appendix A8.14: Watercourse Crossing Data)	International (Cumulatively – for fisheries, habitats and protected fauna)	- Headrace Canal – PSNWBX005 (38 kV) - Glenlonsouth – PSNWCX001 (38 kV) - Blackwater (Clare) – PSNWCX002 (38 kV) - River Shannon – PSNWCX004 (38 kV) - Kilmastulla River – WCX001 (Power connection along R445) and WCX077 (Power connection along R494) - Knockadromin River – WCX002 (WTP Access Road) - Incha Beg Stream – WCX003 (TW – 700) - Knockadromin Stream – WCX004 (TW – 1000) - Burgesbeg Stream – WCX005 (TW – 7500) - Ardgregane Stream – WCX013 (TW – 16500)	- Nenagh River – WCX016 (TW – 19500) - Ballyfinboy – WCX021 (TW – 35000) - Little Brosna River – WCX026 (TW – 13000) - Breaghmore Stream – WCX031 (TWA – 26000) - Camcor River – WCX032 (TWA – 27600) - Silver (Kilcormac) River – WCX036 (TWB – 12600) - Clodiagh (Tullamore) River – WCX039 (TWB – 24900) - Figile River – WCX056 (TWD – 4200) and WCX057 (TWD – 6400) - Grand Canal – WBX078 (TWD – 15100), WBX109 (access route off pipeline) and WX088 (TWE – 14200) - River Liffey – WCX073 (TWE – 9800)	- Watercourses ranked as being of 'high ecological value' with a wetted width of >3m would be crossed by trenchless construction techniques (i.e. 13 out of 24 crossings; WBX078, WBX088, WCX001, WCX016, WCX026, WCX031, WCX032, WCX036, WCX039, WCX056, WCX057, WCX073 and WCX077). These larger watercourses are considered important water bodies for protected aquatic species as well as brown trout fisheries, e.g. Camcor River, Figile River, and the River Liffey (IFI 2018). It can be assumed that coarse fish (cyprinidae, pike and perch) and European eels are also present in most of the larger watercourses. The potential impacts on aquatic flora and fauna as a result of trenchless construction are expected to be minimal with no in-stream works required and the locations for drill rig positioning and pipeline pull areas chosen or engineered such that the fall is away from the water body. However, there may be potential for local removal of some riparian vegetation. Where trenchless crossings occur, there is potential for a 'breakout' of bentonite drilling fluid. This is, in effect, a slurry of very fine suspended solids. In practice there is very low probability of this occurring - Four of the 24 watercourses ranked as being of 'high ecological value' would be crossed by open trench techniques. The four 'high ecological value' watercourses that would be open trenched include: WCX003, WCX005, WCX013 and WCX021. These five watercourses range from 2m to 3m wide and are all second or third-order streams (Appendix A8.14: Watercourse Crossing Data). Protected aquatic species including brook and river lamprey and white-clawed crayfish may be present in these watercourses. Potential impacts associated with open trench construction include removal of and disturbance to in-stream and riparian habitats and increased sediment loading and pollution. In addition, construction activities have the potential to introduce or spread INNS which could result in likely significant negative effects on flora and fauna in the receiving environments in the absence of appropriate mitigation measures - Four of the 24 watercourses ranked as being of 'high ecological value' would be crossed by the 38 kV OHLs (PSNWBX005, PSNWCX001, PSNWCX002 and PSNWCX004) with no instream works proposed - Three of the 24 watercourses ranked as being of 'high ecological value' would be crossed by the clear span bridges (WCX002, WBX004 and WBP221) with no instream works proposed - Movement of machinery/plant over surface water crossings and the placement of temporary bridges for the Proposed Project could result in a reduction in water quality through the introduction of pollution, potentially affecting the aquatic environment and consequently aquatic fauna at and downstream of the crossings - The installation of permanent infrastructure of the Washout Valves has the potential to result in changes to the hydrological flow as a result of channelisation/modification of the water body, excavation of the riverbanks, or changes in water levels due to dewatering of excavations or changes in drainage. Sixteen permanent outfalls associated with permanent Washout Valves would be installed in watercourses ranked as being of a 'high ecological value': Inchabeg Stream (WCX003), Knockadromin Stream (WCX004), Kilmastulla River (at two locations (WA-003 and WA-004) not crossed by the Proposed Project; i.e. river flows adjacent to the Proposed Project at these locations), Burgesbeg Stream (WCX005), Ardgregane Stream (WCX013; and one location (WA-010) not crossed by the Proposed Project; i.e. river flows adjacent to the Proposed Project at this location), Nenagh River (WCX016), Ballyfinboy (WCX021), Little Brosna River (WCX026), Camcor River (WCX032), Silver River (WCX036), Clodiagh River (WCX039), Figile River (WCX056) and the River Liffey (WCX073; and one location (WA-040) not crossed by the Proposed Project; i.e. river flows adjacent to the Proposed Project at this location). In addition, hydrostatic pressure testing and commissioning requiring the abstraction of raw water from watercourses close to the pipeline, and discharge post testing, could lead to habitat degradation as a result of lowering of water levels, flooding, degraded water quality and/or the spread of invasive species.	Trenchless construction: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local to international geographic scale
					Removal of and disturbance to in-stream and riparian habitats associated with open trench construction and temporary bridges: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local to international geographic scale
					Increased sediment loading and pollution associated with open trench construction, temporary bridges, and hydrostatic testing and commissioning: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local to international geographic scale
					Introduction or spread of INNS and pathogens associated with open trench construction and hydrostatic testing and commissioning: - Quality of effects: Negative - Significance: Significant - Probability: Likely - Duration: Long-term - Extent: International geographic scale
					Changes to the hydrological flow associated with the installation of Washout Valves and hydrostatic testing and commissioning: - Quality of effects: Negative - Significance: Significant - Probability: Likely - Duration: Short-term - Extent: Local to international geographic scale

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Summary of Effects
Watercourses (FW1, FW2, FW4) ranked as being of 'medium ecological value'. (Appendix A8.14: Watercourse Crossing Data)	County (Cumulatively – for fisheries, habitats and protected fauna)	Small streams and rivers (first, second and third order) between Figure 8.4 and Figure 8.108 in the Lower Shannon, Barrow, Boyne and Liffey catchments (56 in total)	- Watercourses ranked as being of 'medium ecological value' (56 watercourses in total), would all be crossed by open trench techniques, trenchless techniques (1 of 56) and by temporary bridges for the movement of construction traffic. For the most part, these watercourses were first and second order streams, were generally less than 3m wide, and were found to be unsuitable/sub-optimal for salmonid and lamprey spawning due to factors such as a lack of gravel substrates, poor aeration due to sluggish flows and/or a high degree of siltation in the study area (Appendix A8.14: Watercourse Crossing Data). Therefore, it is unlikely the temporary removal of in-stream substrates within the Proposed Project would remove valuable spawning habitat for salmonids and lamprey species. Although the habitats identified within the study area of these watercourses were considered unsuitable/sub-optimal for salmonid and lamprey spawning, they may provide suitable habitat for lamprey ammocoetes (i.e. in depositing areas of watercourses) and locally important fish and aquatic invertebrates. They may also provide suitable habitats for protected species downstream of the Proposed Project. It is therefore considered, in the absence of appropriate mitigation, removal of in-stream habitats and a potential increase in sediment loading and/or pollution during the Construction Phase could negatively impact protected aquatic flora and fauna within and downstream of the Proposed Project - Without appropriate mitigation measures in place, open trench construction activities have the potential to introduce and/or spread INNS which could result in likely significant negative effects on flora and fauna in the receiving environments - The installation of permanent infrastructure of the Washout Valves has the potential to result in changes to the hydrological flow as a result of channelisation/modification of the water body, excavation of the riverbanks, or changes in water levels due to dewatering of excavations or changes in drainage. Seventeen permanent outfalls associated with permanent Washout Valves would be installed in watercourses ranked as being of a 'medium ecological value': Cloghleigh Stream (WCX009), Patrickswell 25 Stream (WCX010), Derrinclare Stream (WCX023), Shinrone Stream (WCX024), Quakerstown Stream (WCX025) Meelghans Stream (WCX042), Daingean River (WCX048), Esker Stream (Offaly) (WCX049), Figile River (WCX058 and WCX060), Mulgeeth Stream (WCX062), Derrycreeb Stream (WCX064), Blackwater (Longwood) (WCX065), Clonshambo 09 Stream (WCX069), Lyreen 09 Stream (WCX070), Ardross Lower Stream (WCX072) and Reeves Stream (WCX074). In addition, hydrostatic pressure testing and commissioning requiring the abstraction of raw water from watercourses close to the pipeline, and discharge post testing, could lead to habitat degradation as a result of lowering of water levels, flooding, degraded water quality and/or the spread of invasive species - Watercourse crossing WBX008 would be crossed by trenchless techniques during the construction of the Proposed Project due to the steep topography in the area. The potential impacts on aquatic flora and fauna as a result of trenchless construction are expected to be minimal with no in-stream works required and the locations for drill rig positioning and pipeline pull areas chosen or engineered such that the fall is away from the water body. However, there may be potential for local removal of some riparian vegetation. Where trenchless crossings occur, there is potential for a 'breakout' of bentonite drilling fluid. This is, in effect, a slurry of very fine suspended solids. In practice there is very low probability of this occurring.	Removal of and disturbance to in-stream and riparian habitats associated with open trench construction and temporary bridges: - Quality of effects: Negative - Significance: Significant - Probability: Likely - Duration: Short-term - Extent: Local to county geographic scale
				Increased sediment loading and pollution associated with open trench construction, temporary bridges, and hydrostatic testing and commissioning: - Quality of effects: Negative - Significance: Significant - Probability: Likely - Duration: Short-term - Extent: Local to county geographic scale
				Introduction or spread of INNS and pathogens associated with open trench construction and hydrostatic testing and commissioning: - Quality of effects: Negative - Significance: Significant - Probability: Likely - Duration: Long-term - Extent: Local to county geographic scale
				Changes to the hydrological flow associated with the installation of Washout Valves and hydrostatic testing and commissioning: - Quality of effects: Negative - Significance: Significant - Probability: Likely - Duration: Short-term - Extent: Local to county geographic scale
				Trenchless construction: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local to county geographic scale

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Summary of Effects
Watercourses (FW1, FW2, FW4) ranked as being of 'low ecological value'. (Appendix A8.14: Watercourse Crossing Data)	Local importance (higher value) (cumulatively – for fisheries, habitats and protected fauna)	Small streams and drainage ditches (first and second order) in the Lower Shannon, Barrow, Boyne and Liffey catchments	- Watercourses ranked as being of 'low ecological value' (559 watercourses in total), would all be crossed by open trench techniques, trenchless techniques and by temporary bridges for the movement of construction traffic. These watercourses were first and second-order small streams and drainage ditches and were all less than 3m wide. They were found to be unsuitable/sub-optimal for salmonid and lamprey spawning due to factors such as a lack of gravel substrates, poor aeration due to sluggish flows and/or a high degree of siltation (Appendix A8.14: Watercourse Crossing Data). Therefore, it is unlikely the temporary removal of in-stream substrates within the Proposed Project would remove valuable spawning habitat for salmonids and lamprey species; however, it may affect locally important fish and aquatic invertebrate communities. In the absence of appropriate mitigation, removal of in-stream habitats and a potential increase in sediment loading and/or pollution during the Construction Phase could negatively impact locally important aquatic flora and fauna within and downstream of the Proposed Project. - Without appropriate mitigation measures in place, open trench construction activities have the potential to introduce and/or spread INNS which could result in likely significant negative effects on flora and fauna in the receiving environments. - The installation of permanent infrastructure of the Washout Valves has the potential to result in changes to the hydrological flow as a result of channelisation/modification of the water body, excavation of the riverbanks, or changes in water levels due to dewatering of excavations or changes in drainage. Seven permanent outfalls associated with permanent Washout Valves would be installed in watercourses ranked as being of a 'low ecological value': at two unmapped drainage ditches (WBP032 and WBP125), Ardgregane Stream (WCX011), Ardcroney Stream (WCX018), Sheshheraghmore Stream (WCX019), Derrinclare Stream (WCX022), and Aghafullim Stream (WCX066). - Eighteen watercourses ranked as being of 'low ecological value' would be crossed by trenchless techniques during the construction of the Proposed Project. The majority of these crossings would be trenchless due to their proximity to sections that would be crossed by trenchless techniques e.g. road crossings and difficult terrain. The potential impacts on aquatic flora and fauna as a result of trenchless construction are expected to be minimal with no in-stream works required and the locations for drill rig positioning and pipeline pull areas chosen or engineered such that the fall is away from the water body. However, there may be potential for local removal of some riparian vegetation. Where trenchless crossings occur, there is potential for a 'breakout' of bentonite drilling fluid. This is, in effect, a slurry of very fine suspended solids. In practice there is very low probability of this occurring.	Removal of and disturbance to in-stream and riparian habitats associated with open trench construction and temporary bridges: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local geographic scale
				Increased sediment loading and pollution associated with open trench construction and temporary bridges: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local geographic scale
				Introduction or spread of INNS and pathogens associated with open trench construction: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term - Extent: Local geographic scale
				Changes to the hydrological flow associated with the installation of Washout Valves: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local geographic scale
				Trenchless construction: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local geographic scale

Key Ecological Receptor	Evaluation	Area		Potential Construction Phase Impact(s)	Summary of Effects
White-clawed crayfish	International importance – Annex II and V of Habitats Directive and Wildlife Acts	- PSNWBX005 (38 kV) - PSNWBX007 (38 kV) - PSNWBX010 (38 kV) - PSNWCX001 (38 kV) - PSNWCX004 (38 kV) - WBX027 (TWA – 14800) - WBX030 (TWA – 21100) - WBX038 (TWB – 4600) - WBX039 (TWB – 4800) - WBX057 (TWC – 6900) - WBX058 (TWC – 10000) - WBX062 (TWC – 11100) - WBX088 (TWE – 14200) - WBX092 (TWB – 13600) - WBX094 (TWB – 4700) - WBX097 (TWB – 11000) - WBX107 (TWB – 4700) - WCX001 (power connection along R445) - WCX002 (access road) - WCX003 (TW – 700) - WCX004 (TW – 1000) - WCX005 (TW – 7500) - WCX006 (TW – 8500) - WCX013 (TW – 16500) - WCX016 (TW – 19500)	- WCX021 (TW – 35000) - WCX026 (TWA – 13000) - WCX027 (TWA – 17500) - WCX029 (TWA – 24800) - WCX031 (TWA – 26000) - WCX032 (TWA – 27600) - WCX034 (TWB – 6600) - WCX035 (TWB – 7800) - WCX036 (TWB – 12600) - WCX039 (TWB – 24900) - WCX042 (TWC – 5000) - WCX048 (TWC – 18900) - WCX049 (TWC – 20300) - WCX056 (TWD – 4200) - WCX057 (TWD – 6400) - WCX059 (TWD – 14400) - WCX061 (TWD – 24300) - WCX062 (TWD – 26400) - WCX067 (TWE – 700) - WCX069 (TWE – 2400) - WCX070 (TWE – 3600) - WCX071 (TWE – 9000) - WCX072 (TWE – 9100) - WCX073 (TWE – 9800) - WCX074 (TWE – 11400) - WCX077 (power connection along R494) - WCX078 (power connection along the R440) - WCX085 (power to line valve TWC – 17500)	- Potential impacts associated with open trench construction and temporary bridges include removal of and disturbance to in-stream and riparian habitats. In addition, construction activities have the potential to introduce or spread INNS, including the crayfish plague which could result in likely significant negative effects on white-clawed crayfish in the receiving environments in the absence of appropriate mitigation measures - The construction of the Proposed Project may cause the pollution of watercourses within the Proposed Project as a result of suspended solids. The introduction of suspended solids can pose negative impacts to white-clawed crayfish in the following ways: reduction in visibility, reduction in available food, high concentrations can serve as a sink or carrier for toxins/chemicals, can affect gill structure and can decrease dissolved oxygen levels - The potential impacts on this species as a result of trenchless construction are expected to be minimal with no in-stream works required and the locations for drill rig positioning and pipeline pull areas chosen or engineered such that the fall is away from the water body. However, there may be potential for local removal of some riparian vegetation. Where trenchless crossings occur, there is potential for a 'breakout' of bentonite drilling fluid. This is, in effect, a slurry of very fine suspended solids. In practice there is very low probability of this occurring - The installation of the permanent Washout Valves has the potential to cause disturbance impacts as a result of channelisation/modification of the water body, excavation of the riverbanks, or changes in water levels due to dewatering of excavations or changes in drainage. Permanent Washout Valves would be installed at the following watercourses which have suitable habitat for white-clawed crayfish: WCX003, WCX004, WCX005, WCX013, WCX016, WCX021, WCX026, WCX032, WCX036, WCX039, WCX042, WCX048, WCX049, WCX056, WCX062, WCX069, WCX070, WCX072, WCX073, and WCX074. In addition, hydrostatic pressure testing and commissioning requiring the abstraction of raw water from watercourses close to the pipeline, and discharge post testing, could lead to habitat degradation as a result of lowering of water levels, scouring, flooding, degraded water quality and/or the spread of invasive species.	Removal of and disturbance to in-stream and riparian habitats associated with open trench construction and temporary bridges: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: County geographic scale
					Trenchless construction: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local to international geographic scale
					Increased sediment loading and pollution associated with open trench construction, temporary bridges, and hydrostatic testing and commissioning: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local to international geographic scale
					Introduction or spread of INNS and pathogens associated with open trench construction and hydrostatic testing and commissioning: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term - Extent: Local to international geographic scale
Freshwater pearl mussel	International importance – Annex II and V of Habitats Directive and Wildlife Acts	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.		No predicted impacts.	Habitat degradation or disturbance associated with the installation of Washout Valves and hydrostatic testing and commissioning: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local to international geographic scale
					No likely significant effect at any geographic scale.

Key Ecological Receptor	Evaluation	Area		Potential Construction Phase Impact(s)	Summary of Effects
Atlantic salmon	International importance – Annex II and V of Habitats Directive	- PSNWBX005 (38 kV) - PSNWBX010 (38 kV) - PSNWCX001 (38 kV) - PSNWCX002 (38 kV) - PSNWCX003 (38 kV) - PSNWCX004 (38 kV) - WBP011 (TWA – 15300) - WBP309 (TWC – 700) – Potential spawning only - WBX008 (TW – 3500) - WBX010 (TW – 4000) - WBX012 (TW – 4900) – Potential spawning habitat only - WBX025 (TWA – 12100) - WBX027 (TWA – 14800) – Potential spawning habitat only - WBX030 (TWA – 21100) - WBX034 (TWA – 27200) – Potential spawning habitat only - WBX038 (TWB – 4600) - WBX039 (TWB – 4800) - WBX057 (TWC – 6900) - WBX058 (TWC – 10000) - WBX060 (TWC – 10300) – Potential spawning habitat only - WBX061 (TWC – 10400) – Potential spawning habitat only - WBX062 (TWC – 11100) - WBX078 (TWD – 15100) - WBX092 (TWB – 13600) - WBX094 (TWB – 19100) - WBX097 (TWB – 11000) - WBX107 (TWB – 4700) - WBX109 (access route to TWD-14400) - WBX112 (power connection along R440) - WCX001 (power connection along R445) - WCX002 (access road along R445) - WCX003 (TW – 700) – Potential spawning habitat only - WCX004 (TW – 1000) - WCX005 (TW – 7500) – Potential spawning habitat only - WCX006 (TW – 8500) - WCX008 (TW – 10200) - WCX012 (TW – 15000) - WCX013 (TW – 16500) - WCX016 (TW – 19500) - WCX021 (TW – 35000) - WCX023 (TWA – 5600)	- WCX024 (TWA – 8000) – Potential spawning habitat only - WCX025 (TWA – 9400) - WCX026 (TWA – 13000) – Potential spawning habitat only - WCX027 (TWA – 17500) - WCX028 (TWA – 23800) - WCX029 (TWA – 24800) - WCX031 (TWA – 26000) - WCX032 (TWA – 27600) - WCX033 (TWB – 1400) - WCX034 (TWB – 6600) - WCX035 (TWB – 7800) - WCX036 (TWB – 12600) - WCX039 (TWB – 24900) - WCX040 (TWC – 1000) – potential spawning habitat only - WCX041 (TWC – 3300) – potential spawning habitat only - WCX042 (TWC – 5000) - WCX045 (TWC – 9700) - WCX048 (TWC – 18900) - WCX049 (TWC – 20300) – potential spawning habitat only - WCX054 (TWC – 22800) – potential spawning habitat only - WCX056 (TWD – 4200) - WCX057 (TWD – 6400) - WCX058 (TWD – 8900) - WCX059 (TWD – 14400) - WCX060 (TWD – 18100) - WCX061 (TWD – 24300) - WCX062 (TWD – 26400) - WCX065 (TWD – 29100) - WCX066 (TWD – 32700) - WCX068 (TWE – 1800) - WCX069 (TWE – 2400) - WCX070 (TWE – 3600) - WCX073 (TWE – 9800) - WCX077 (power connection along R494)) - WCX078 (power connection along R440) - WCX079 (power to line valve TWD – 8000) - WCX082 (power to line valve TWC – 22900) - WCX083 (power to line valve TWD – 12700) - WCX085 (power to line valve TWC – 17500)	- The construction of the Proposed Project may cause the pollution of watercourses within the Proposed Project as a result of suspended solids. The introduction of suspended solids can pose negative impacts to Atlantic salmon in the following ways: reduction in visibility, reduction in available food, high concentrations can serve as a sink or carrier for toxins/chemicals, can damage gills, can decrease dissolved oxygen levels and can settle and smother eggs in spawning gravels - The potential impacts on this species as a result of trenchless construction are expected to be minimal with no in-stream works required and the locations for drill rig positioning and pipeline pull areas chosen or engineered such that the fall is away from the water body. However, there may be potential for local removal of some riparian vegetation. Where trenchless crossings occur, there is potential for a 'breakout' of bentonite drilling fluid. This is, in effect, a slurry of very fine suspended solids. In practice there is very low probability of this occurring - Potential impacts associated with open trench construction and temporary bridges include removal of and disturbance to in-stream and riparian habitats such as spawning gravels, and potential mortality of salmonid eggs, alevins and fry - The installation of the permanent Washout Valves has the potential to cause disturbance impacts as a result of channelisation/modification of the water body, excavation of the riverbanks, or changes in water levels due to dewatering of excavations or changes in drainage. These impacts include physical disturbance and inputs of sediments which may affect spawning gravels. Permanent Washout Valves would be installed at the following watercourses which have suitable habitat for Atlantic Salmon: Kilmastulla River (at two locations not crossed by the Proposed Project), WCX003, WCX004, WCX005, WCX013, WCX016, WCX021, WCX023, WCX025, WCX026, WCX032, WCX036, WCX039, WCX042, WCX048, WCX056, WCX058, WCX060, WCX062, WCX065, WCX066, WCX069, WCX070 and WCX073. In addition, hydrostatic pressure testing and commissioning requiring the abstraction of raw water from watercourses close to the pipeline, and discharge post testing, could lead to habitat degradation as a result of lowering of water levels, flooding, degraded water quality and/or the spread of invasive species.	Removal of and disturbance to in-stream and riparian habitats associated with open trench construction and temporary bridges: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: County geographic scale
					Trenchless construction: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local to international geographic scale
					Increased sediment loading and pollution associated with open trench construction, temporary bridges, and hydrostatic testing and commissioning: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: County geographic scale
					Risk of mortality associated with open trench construction: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent - Extent: Local geographic scale
					Habitat degradation or disturbance associated with the installation of Washout Valves and hydrostatic testing and commissioning: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local to international geographic scale

Key Ecological Receptor	Evaluation	Area		Potential Construction Phase Impact(s)	Summary of Effects
Lamprey species	International importance – Annex II of Habitats Directive	- PSNWBX005 (38 kV) - PSNWBX010 (38 kV) - PSNWCX001 (38 kV) - PSNWCX002 (38 kV) - PSNWCX003 (38 kV) - WBP309 (TWC – 700) – Potential spawning habitat only - WBX001 (access road) - WBX002 (RWA Access Road) - WBX008 (TW – 3500) - WBX010 (TW – 4000) – Potential spawning habitat only - WBX017 (TW – 19200) - WBX023 (TWA – 7800) - WBX026 (TWA – 13200) - WBX027 (TWA – 14800) - WBX033 (TWA – 21300) - WBX034 (TWA – 27200) - WBX038 (TWB – 4600) - WBX039 (TWB – 4600) - WBX057 (TWC – 6900) - WBX058 (TWC – 10000) - WBX060 (TWC – 10300) – Potential spawning habitat only - WBX061 (TWC – 10400) – Potential spawning habitat only - WBX062 (TWC – 11100) - WBX088 (TWE – 14200) - WBX092 (TWB – 13600) - WBX093 (TWB – 14800) - WBX094 (TWB – 19100) - WBX097 (TWB – 11000) - WBX107 (TWB – 4700) - WCX001 (power connection along R445) - WCX002 (access road) - WCX003 (TW – 700) - WCX004 (TW – 1000) - WCX005 (TW – 7500) - WCX006 (TW – 8500) - WCX008 (TW – 10200) - WCX009 (TW – 10500) - WCX010 (TW – 11200) - WCX012 (TW – 15000) – potential spawning habitat only - WCX013 (TW – 16500) - WCX016 (TW – 19500) - WCX021 (TW – 35000)	- WCX023 (TWA – 5600) - WCX024 (TWA – 8000) – Potential spawning habitat only - WCX026 (TWA – 13000) - WCX027 (TWA – 17500) - WCX028 (TWA – 23800) – Potential spawning habitat only - WCX029 (TWA – 24800) - WCX031 (TWA – 26000) – Potential spawning habitat only - WCX032 (TWA – 27600) - WCX033 (TWB – 1400) - WCX034 (TWB – 6600) - WCX035 (TWB – 7800) - WCX036 (TWB – 12600) - WCX039 (TWB – 24900) - WCX040 (TWC – 1000) – potential spawning habitat only - WCX041 (TWC – 3300) – potential spawning habitat only - WCX042 (TWC – 5000) - WCX043 (TWC – 5600) - WCX044 (TWC – 8900) - WCX045 (TWC – 9700) - WCX048 (TWC – 18900) - WCX049 (TWC – 20300) - WCX054 (TWC – 22800) - WCX056 (TWD – 4200) - WCX057 (TWD – 6400) - WCX058 (TWD – 8900) - WCX059 (TWD – 14400) - WCX061 (TWD – 24300) - WCX062 (TWD – 26400) - WCX064 (TWD – 28500) - WCX065 (TWD – 29100) - WCX066 (TWD – 32700) - WCX068 (TWE – 1800) - WCX069 (TWE – 2400) - WCX070 (TWE – 3600) - WCX073 (TWE – 9800) - WCX077 (power connection along R494)) - WCX078 (power connection along R440) - WCX079 (power to line valve TWD – 8000) - WCX085 (power to line valve TWC – 17500)	- The construction of the Proposed Project may cause the pollution of watercourses within the Proposed Project as a result of suspended solids. The introduction of suspended solids can pose negative impacts to lamprey species in the following ways: reduction in visibility, reduction in available food, high concentrations can serve as a sink or carrier for toxins/chemicals and can decrease dissolved oxygen levels - The potential impacts on this species as a result of trenchless construction are expected to be minimal with no in-stream works required and the locations for drill rig positioning and pipeline pull areas chosen or engineered such that the fall is away from the water body. However, there may be potential for local removal of some riparian vegetation. Where trenchless crossings occur, there is potential for a 'breakout' of bentonite drilling fluid. This is, in effect, a slurry of very fine suspended solids. In practice there is very low probability of this occurring - Potential impacts associated with open trench construction include removal of and disturbance to in-stream and riparian habitats such as spawning gravels and silt beds, and potential mortality of lamprey ammocoetes - The installation of the permanent Washout Valves has the potential to cause disturbance impacts as a result of channelisation/modification of the water body, excavation of the riverbanks, or changes in water levels due to dewatering of excavations or changes in drainage. These impacts include physical disturbance and inputs of sediments which may affect spawning gravels. Permanent Washout Valves would be installed at the following watercourses which have suitable habitat for lamprey species: Kilmastulla River (at two locations not crossed by the Proposed Project), WCX003, WCX004, WCX005, WCX009, WCX010, WCX013, WCX016, WCX021, WCX023, WCX026, WBX032, WCX036, WCX039, WCX042, WCX048, WCX049, WCX056, WCX058, WCX062, WCX064, WCX065, WCX066, WCX069, WCX070 and WCX073. In addition, hydrostatic pressure testing and commissioning requiring the abstraction of raw water from watercourses close to the pipeline, and discharge post testing, could lead to habitat degradation as a result of lowering of water levels, flooding, degraded water quality and/or the spread of invasive species.	Removal of and disturbance to in-stream and riparian habitats associated with open trench construction and temporary bridges: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: County geographic scale Trenchless construction: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local to international geographic scale Increased sediment loading and pollution associated with open trench construction, temporary bridges, and hydrostatic testing and commissioning: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: County geographic scale Risk of mortality associated with open trench construction: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent - Extent: Local geographic scale Habitat degradation and disturbance associated with the installation of Washout Valves and hydrostatic testing and commissioning: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local to international geographic scale

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Summary of Effects
European eel	County importance	WCX039 (TWB – 24788).	- The construction of the Proposed Project may cause the pollution of watercourses within the Proposed Project as a result of suspended solids. European eel are sensitive to construction related pollution and sediment (OSPAR 2022) - The potential impacts on this species as a result of trenchless construction are expected to be minimal with no in-stream works required and the locations for drill rig positioning and pipeline pull areas chosen or engineered such that the fall is away from the water body. However, there may be potential for local removal of some riparian vegetation. Where trenchless crossings occur, there is potential for a 'breakout' of bentonite drilling fluid. This is, in effect, a slurry of very fine suspended solids. In practice there is very low probability of this occurring - The installation of the permanent Washout Valves has the potential to cause disturbance impacts as a result of channelisation/modification of the water body, excavation of the riverbanks, or changes in water levels due to dewatering of excavations or changes in drainage. These impacts include physical disturbance and inputs of sediments which may negatively affect eel. Permanent Washout Valves would be installed at WCX039. In addition, hydrostatic pressure testing and commissioning requiring the abstraction of raw water from watercourses close to the pipeline, and discharge post testing, could lead to habitat degradation as a result of lowering of water levels, flooding, degraded water quality and/or the spread of invasive species.	Removal of and disturbance to in-stream and riparian habitats associated with open trench construction and temporary bridges: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local geographic scale
				Trenchless construction: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local to county geographic scale
				Increased sediment loading and pollution associated with open trench construction, temporary bridges, and hydrostatic testing and commissioning: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: County geographic scale
				Risk of mortality associated with open trench construction: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent - Extent: Local geographic scale
				Habitat degradation and disturbance associated with the installation of Washout Valves and hydrostatic testing and commissioning: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local geographic scale

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Summary of Effects
All other fish species	Local importance (higher value)	Parteen Basin, Old River Shannon, and watercourses crossed by the Proposed Project in the Lower Shannon, Barrow, Boyne and Liffey catchments.	- The construction of the Proposed Project may cause the pollution of watercourses within the Proposed Project as a result of suspended solids. The introduction of suspended solids can pose negative impacts to other fish in the following ways: reduction in visibility, reduction in available food, high concentrations can serve as a sink or carrier for toxins/chemicals, can damage gills, can decrease dissolved oxygen levels and can settle and smother eggs in spawning gravels - The potential impacts on other fish species as a result of trenchless construction are expected to be minimal with no in-stream works required and the locations for drill rig positioning and pipeline pull areas chosen or engineered such that the fall is away from the water body. However, there may be potential for local removal of some riparian vegetation. Where trenchless crossings occur, there is potential for a 'breakout' of bentonite drilling fluid. This is, in effect, a slurry of very fine suspended solids. In practice there is very low probability of this occurring - The installation of the permanent Washout Valves has the potential to cause disturbance impacts as a result of channelisation/modification of the water body, excavation of the riverbanks, or changes in water levels due to dewatering of excavations or changes in drainage. These impacts include physical disturbance and inputs of sediments which may negative affect other fish species. In addition, hydrostatic pressure testing and commissioning requiring the abstraction of raw water from watercourses close to the pipeline, and discharge post testing, could lead to habitat degradation as a result of lowering of water levels, flooding, degraded water quality and/or the spread of invasive species.	Removal of and disturbance to in-stream and riparian habitats associated with open trench construction and temporary bridges: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local geographic scale
				Trenchless construction: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local geographic scale
				Increased sediment loading and pollution associated with open trench construction, temporary bridges, and hydrostatic testing and commissioning: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local geographic scale
				Risk of mortality associated with open trench construction: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent - Extent: Local geographic scale
				Habitat degradation and disturbance associated with the installation of Washout Valves and hydrostatic testing and commissioning: - Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term - Extent: Local geographic scale

8.5.4 Ornithology – Breeding Birds

8.5.4.1 Key Species of Conservation Significance

748. This section describes and assesses the potential for the Proposed Project to result in likely significant effects on breeding birds in the absence of mitigation. Potential impacts on breeding avian communities during the Construction Phase within the study area of the Proposed Project have been divided into three main types: habitat loss and fragmentation (Section 8.5.4.1.1), habitat degradation as a result of reduced quality of foraging habitat (Section 8.5.4.1.2), and disturbance/displacement (Section 8.5.4.1.3). Details on the construction of the Proposed Project can be found in Chapter 5 (Construction & Commissioning).

8.5.4.1.1 *Habitat Loss and Fragmentation*

749. The route of the Proposed Project and the sites for the RWI&PS, WTP, BPT, BPS, FCV and TPR were carefully selected to minimise the potential for direct and indirect impacts on habitats of local importance (higher value) or greater. However, the construction of the Proposed Project would result in temporary and permanent habitat loss which would consequently reduce the availability of local habitat for birds.

750. The construction impacts associated with the Proposed Project are expected to last for the duration of the Construction Phase, which is estimated to be five years. Construction of the pipeline would be conducted in manageable lengths; portions of the pipeline route would be 'opened up' to create a new construction area once works in the previous construction area are suitably progressed/nearing completion. This would minimise the duration that an area is exposed to construction works. It is therefore reasonable to conclude that a section of land exposed to construction activity (associated with pipeline installation) would be reinstated within 24 months. After each section of the pipeline is installed, the land would be generally restored to pre-existing ground conditions with the exception of the 20m wide Permanent Wayleave, where post construction, landowners would not be permitted to plant larger species of trees such as poplar or willow within the wayleave due to the potential impact from their roots on the pipeline. The planting of some smaller trees, shrubs or hedges, are permitted, so long as they do not exceed 4m in height. The appraisal method guidelines for assessing potential impacts (Section 8.2.7) suggest quantifying the duration of a given impact based on ecological characteristics, such as a species' lifecycle. Therefore, the duration of habitat loss/fragmentation along the Proposed Project is expected to be short-term and last approximately one to two breeding seasons.

751. With regard to the proposed 38 kV Uprate Works, for the access tracks, the worst-case scenario is that temporary habitat clearance would be required along a 3m-wide corridor to each existing poleset. The majority of habitats within the access track area are improved agricultural grassland, with the most sensitive habitats including watercourses, hedgerows, treelines at crossing points, and rank grassland and scrub. During the identification process of possible access tracks, existing tracks such as farm entrances were selected where feasible, thus reducing the amount of vegetation clearance required for the proposed 38 kV Uprate Works. The public road network would be used for the delivery of materials, plant and equipment from off-site compounds to the development corridor and individual polesets. 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. The trench for this line would occur along the existing roadway, minimising the loss of habitat for bird species.

752. Table 8.66 assesses the potential effects of habitat loss and fragmentation on the key breeding avian ecological receptor species as a result of the Proposed Project (excluding the 38 kV Uprate Works), while Table 8.67 assesses the potential effects of habitat loss and fragmentation on the KER avian ecological receptor species (i.e. species which were recorded frequently, in potentially significant numbers, and/or are considered to be of high conservation concern) as a result of the proposed 38 kV Uprate Works. The methodology of the assessment of the impact of habitat loss and fragmentation follows (Percival 2003) and (EPA 2022), as discussed in Section 8.2.7.

Table 8.66: Assessing the Potential Pre-Mitigation Effects of Habitat Loss and Fragmentation During the Construction Phase on Breeding Bird Key Ecological Receptors as a Result of the Proposed Project (excluding the 38 kV Uprate Works)

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Barn owl (Medium)	This species was recorded foraging on three occasions during the 2016 and 2024 bird surveys during the breeding bird season and was confirmed to be breeding as an incidental record during a bat survey in 2025. This confirmed breeding record was recorded within the boundary of the Proposed Project and as such will be subject to habitat loss. Given the short-term nature of the construction works, and the availability of similar suitable habitats in the wider surroundings, there is low concern for foraging habitat loss for this species, however when considering the permanent loss of a nest, the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Medium Magnitude: Medium Significance: Moderate Permanent, Moderate negative effects
Black-headed gull (High)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide no suitable breeding habitat for black-headed gull. This species was primarily recorded foraging on Lough Derg, Parteen Basin, Lough Ourna and some recently re-wetted bogs in county Offaly. This species was recorded frequently at these sites during the breeding bird season between 2016 and 2024. A large breeding colony of national importance was recorded at Lough Ourna from 2016 to 2024; this breeding colony was greater than 1.5km from the Proposed Project. From 2022, new colonies were recorded within 500m of the Proposed Project, on recently re-wetted bogs in county Offaly. Given the short-term nature of the construction works, the unsuitability of the majority of habitats within the Proposed Project for this species, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment or extensive bog networks in counties Offaly and Kildare), the magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Coot (High)	Various habitats in and surrounding Parteen Basin (where the proposed RWI&PS site is located) are used by breeding coot. This species was regularly recorded at Parteen Basin during the breeding bird surveys between 2016 and 2024, most often in fringing habitat on the western shore. The magnitude of habitat loss is considered to be low if habitat loss is 1-5%, and negligible if less than 1%. The total area of Parteen Basin is 3.4km ² , therefore 1% is equal to 0.034km ² . The total area of the RWI (aquatic habitat) is 0.0056km ² . Therefore, habitat loss is calculated to be less than 1%. Given the proportionately small area within Parteen Basin proposed for the development infrastructure (<1% habitat loss), and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Permanent, Not Significant negative effects
Curlew (High)	Habitats within the Proposed Project are considered sub-optimal breeding and foraging habitat for curlew. Based on a consistent survey effort from 2016 to 2024 this species was recorded infrequently in low numbers within the Proposed Project during the breeding bird surveys. There was no evidence that breeding activity was attempted or occurred or within the study area. Given the short-term nature of the construction works, the sub-optimal nature of the habitats within the Proposed Project and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Great crested grebe (High)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide no suitable breeding habitat for great crested grebe. This species was primarily recorded foraging on Parteen Basin and Lough Ourna. The species was recorded breeding at Lough Ourna from 2016 to 2024; these breeding records are greater than 1.5km from the Proposed Project. Given the short-term nature of the construction works, the unsuitability of the majority of habitats within the Proposed Project for this species, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Grey wagtail (Medium)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide no suitable breeding habitat for grey wagtail. This species was primarily recorded along watercourses and large water bodies along the Proposed Project. The species was recorded breeding at Killaloe, County Clare in 2017 and along a river near Kilurane County Tipperary from 2016 to 2024. These breeding records were located outside the footprint of the Proposed Project. Given the short-term nature of the construction works, the unsuitability of the majority of habitats within the Proposed Project for this species, and the availability of alternative habitats in the wider surroundings (i.e. upstream and downstream of rivers), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Hen harrier (High)	No hen harrier nest sites were recorded within the Proposed Project, therefore, no direct loss of nesting habitat would result from construction works. This species was recorded in low numbers during the breeding bird surveys carried out between 2016 and 2024. Given the short-term duration of the Construction Phase, the wide-ranging nature of this species, and the availability of similar suitable habitats in the wider surroundings, the magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Kestrel (Medium)	Kestrel breeding activity was recorded within the Proposed Project; therefore, it is considered likely that some kestrel breeding habitat would be lost as a result of the construction of the Proposed Project. This species was found to be present year round, foraging within the environs of the Proposed Project during surveys carried out between 2016 and 2024. Given the short-term duration of the construction works, the species' use of varied habitats, and the availability of similar suitable habitats in the wider surroundings, the magnitude of the impact is assessed to be low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Kingfisher (Medium)	The majority of habitats within the Proposed Project are terrestrial habitats and provide little or no suitable breeding habitat and are sub-optimal for foraging for kingfisher. Surveys carried out between 2016 and 2024 recorded this species year-round, primarily foraging on Lough Derg, Parteen Basin and at other wetland sites within the Proposed Project. The western shoreline of Parteen Basin provides overhanging vegetation favoured by foraging kingfisher. By contrast, a large portion of the eastern shoreline is composed of a modified embankment and is unfavourable for foraging kingfisher. It is proposed to construct the RWI&PS on the eastern shoreline. In 2016, a kingfisher nest site was located within the Proposed Project near Castledillon Upper, County Kildare along the River Liffey (Appendix A8.21: Breeding Bird Surveys Summary Report). In 2017 an additional nest site was located within the Proposed Project at Cloghanmore, County Offaly along the Camcor River (Appendix A8.21: Breeding Bird Surveys Summary Report). It is proposed to cross both of these rivers by trenchless excavation (Chapter 5: Construction & Commissioning). Therefore, nest sites at these locations may be disturbed as a result of the construction of the Proposed Project but would not be directly impacted. Given construction works would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of Low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Lapwing (Medium)	The construction of the Proposed Project would result in a short-term loss of lapwing breeding habitat locally. Based on a consistent survey effort from 2016 to 2024, the most noteworthy observations of lapwing were made during the breeding season. These breeding lapwing records were principally confined to a large bog complex surrounding the Proposed Project between the R400 and R403 roads, to the south of Edenderry, County Offaly (Appendix A8.21: Breeding Bird Surveys Summary Report). This species is considered to be dependent on these peatland habitats surrounding the Proposed Project for breeding. The construction of the Proposed Project would result in a land-take which would consequently reduce the availability of local habitat for breeding lapwing. Given the Construction Phase would be short-term in duration, this species is expected to use these habitats post construction. Therefore the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Mallard (Low)	Mallard was frequently recorded during the 2016 to 2024 breeding seasons, often on large water bodies or ponds and near wetland areas along the Proposed Project. Breeding was confirmed at a number of locations, the majority of which were recorded on large water bodies such as Parteen Basin and Lough Ourna, County Tipperary, but also breeding on a number of pool/ponds within bogs in Counties Offaly and Kildare. Given the short-term nature of the construction works, the unsuitability of the majority of habitats within the Proposed Project for this species, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant negative effects
Meadow pipit (Medium)	The construction of the Proposed Project would result in a short-term loss of meadow pipit breeding habitat locally. Based on a consistent survey effort from 2016 to 2024, the most noteworthy observations of meadow pipit were made during the breeding season. The majority of these breeding meadow pipit records were confined to a large bog complex within and surrounding the Proposed Project in Counties Offaly and Kildare as well as wet grasslands and meadows in County Tipperary (Appendix A8.21: Breeding Bird Surveys Summary Report). The construction of the Proposed Project would result in a land-take which would consequently reduce the availability of local habitat for breeding meadow pipit. Given the Construction Phase would be short-term in duration, this species is expected to use these habitats post-construction. Therefore, the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects
Mute swan (High)	Various habitats in and surrounding Parteen Basin (where the proposed RWI&PS site is located) are used by breeding mute swan. This species was consistently recorded at Parteen Basin during the breeding bird season between 2016 and 2024, most often in fringing habitat on the western shore. The magnitude of habitat loss is considered to be low if habitat loss is 1-5%, and negligible if less than 1%. The total area of Parteen Basin is 3.4km ² , therefore 1% is equal to 0.034km ² . The total area of the RWI (aquatic habitat) is 0.0056km ² . Therefore habitat loss is calculated to be less than 1%. Given the proportionately small area within Parteen Basin proposed for the development infrastructure (<1% habitat loss), and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Permanent, Not Significant negative effects
Peregrine falcon (Medium)	The majority of habitats within the Proposed Project are sub-optimal breeding habitat for peregrine falcon. A nest site was recorded near the Proposed Project, at the Edenderry Power Station, County Offaly (greater than 1km from the Proposed Project). This species was recorded foraging within the environs of the Proposed Project during surveys carried out between 2016 and 2024. Given the short-term duration of the construction works, the species' use of varied habitats, and the availability of similar suitable habitats in the wider surroundings, the magnitude of the impact is assessed to be low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Ringed plover (Low)	The construction of the Proposed Project would result in a short-term loss of ringed plover breeding habitat locally. Based on a consistent survey effort from 2016 to 2024, the most noteworthy observations of ringed plover were made during the breeding season. These breeding ringed plover records were principally confined to a large bog complex surrounding the Proposed Project, particularly to the south and east of Daingean, County Offaly (Appendix A8.21: Breeding Bird Surveys Summary Report). This species is considered to be dependent on these peatland habitats surrounding the Proposed Project for breeding. The construction of the Proposed Project would result in a land-take which would consequently reduce the availability of local habitat for breeding ringed plover. Given the Construction Phase would be short-term in duration, this species is expected to use these habitats post construction. Therefore the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Low Magnitude: Medium Significance: Slight Short-term, Slight negative effects
Sand martin (Low)	In 2016 and 2017 this species was found to use peat banks for breeding in several locations and a number of nests were located along the Proposed Project (Appendix A8.21: Breeding Bird Surveys Summary Report). The largest breeding colony of 100 nests was recorded in 2019 in Kilcolman, County Offaly. It is therefore considered likely that some sand martin breeding habitat would be permanently lost as a result of the construction of the Proposed Project. Given construction impacts would be short-term in duration, the species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Permanent, Not Significant negative effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Snipe (Medium)	The construction of the Proposed Project would result in a short-term loss of snipe breeding habitat locally. Based on a consistent survey effort from 2016 to 2024, the most noteworthy observations of snipe were made during the breeding season. The majority of these breeding snipe records were confined to a large bog complex surrounding the Proposed Project in Counties Offaly and Kildare (Appendix A8.21: Breeding Bird Surveys Summary Report). The construction of the Proposed Project would result in a land-take which would consequently reduce the availability of local habitat for breeding snipe. Given the Construction Phase would be short-term in duration, this species is expected to use these habitats post construction. Therefore the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects
Woodcock (Medium)	Based on a consistent survey effort from 2016 to 2024, the most noteworthy observations of woodcock were made during the breeding season. The majority of these breeding woodcock records were principally confined to a large bog complex surrounding the Proposed Project approximately 5km south of Enfield, County Kildare. Species-specific surveys did not locate any nest sites within the Proposed Project. Woodcock was found to use only a small portion of the Proposed Project, in low numbers. Additionally, the wider surroundings contain similar suitable habitat. Therefore, this species was assessed not to be dependent solely on the habitats within the Proposed Project. The magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Yellowhammer (Medium)	The construction of the Proposed Project would result in a short-term loss of yellowhammer breeding habitat locally. Based on a consistent survey effort from 2016 to 2024, the most noteworthy observations of yellowhammer were made during the breeding season. These breeding yellowhammer records were confined to the easterly portion of the Proposed Project; however, in 2018 and 2019 recordings were more evenly spread throughout the Proposed Project. These records were typically found in hedgerows and strongly linked to areas where cereal crops were in cultivation (Appendix A8.21: Breeding Bird Surveys Summary Report). This species is considered to be dependent on hedgerows and arable fields within and surrounding the Proposed Project for breeding. The construction of the Proposed Project would result in the removal of hedgerows which would consequently reduce the availability of local habitat for breeding yellowhammer. Given the Construction Phase would be short-term in duration, the abundance of existing hedgerow outside the Proposed Project would remain undisturbed, and that the majority of removed hedgerow is to be replanted, the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects
Other Species of Low Conservation Significance (as listed in Table 8.44) (Medium to Very Low)	The construction of the Proposed Project would result in a short-term local loss of breeding habitat for several species. Based on consistent survey efforts from 2016 to 2024, breeding was confirmed or assumed for these species (Appendix A8.21: Breeding Bird Surveys Summary Report). Certain Green and Amber Listed (BoCCI) passerine species rely on hedgerows, scrub, and agricultural fields within and around the Proposed Project for breeding. The removal of hedgerows during construction would reduce the availability of suitable breeding habitat for these species. Species such as house martin, house sparrow, starling, swift, and swallow are unlikely to be significantly affected, as their nesting ecology primarily involves buildings or other man-made structures, no suitable examples of which would be removed during construction. Given that the Construction Phase would be short-term, that existing suitable breeding habitat outside the Proposed Project area would remain undisturbed, that most removed hedgerows would be replanted, and that some species would not experience habitat loss, the magnitude of the impact on these other species of low conservation significance is assessed to be of low concern.	Sensitivity: Medium to Very Low Magnitude: Low Significance: Slight to Imperceptible Short-term, Slight to Imperceptible negative effects

Note: * Percival Significance Evaluation is calculated as a product of the sensitivity (Table 8.19) of the species and the magnitude (Table 8.20) of the effect.

Table 8.67: Assessing the Potential Pre-Mitigation Effects of Habitat Loss and Fragmentation During the Construction Phase on Breeding Bird Key Ecological Receptors as a Result of the 38 kV Uprate Works

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Black-headed gull (High)	The majority of habitats within the proposed 38 kV Uprate Works are sub-optimal for foraging and provide no suitable breeding habitat for black-headed gull. This species was primarily recorded foraging on the Lower River Shannon and Parteen Basin. This species was recorded frequently at these two sites during the summer months between 2019 and 2024. Given the short-term nature of the construction works, the unsuitability of the majority of habitats within the proposed 38 kV Uprate Works for this species, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Common gull (Low)	Common gull was recorded on one occasion during the 2020 breeding surveys. It was recorded commuting upstream along the river and flew above the existing OHLs. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Low Magnitude: Negligible Significance: Not Significant Short-term, Not Significant negative effects
Coot (High)	Coots were regularly observed during VP surveys as they foraged at O'Briensbridge in 2019. No flights were recorded. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), there is limited potential for ecologically significant habitat loss and fragmentation and/or displacement effects on coot. The magnitude of the impact is assessed to be of negligible concern.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Short-term, Not Significant negative effects
Cormorant (Very High)	This species was consistently recorded at Parteen Basin and the Lower River Shannon during summer months between 2019 and 2024. This species was most often recorded commuting along the Lower River Shannon as it flew between Parteen Basin and the River Fergus/Shannon Estuary and foraging on the Lower River Shannon. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Very High Magnitude: Negligible Significance: Slight Short-term, Slight negative effects
Curlew (High)	Habitats within the proposed 38 kV Uprate Works are considered sub-optimal breeding and foraging habitat for curlew. This species was recorded on one occasion during summer months. Given the short-term nature of the construction works, the sub-optimal nature of the habitats within the proposed 38 kV Uprate Works and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of habitat loss and fragmentation is assessed to be of negligible concern.	Sensitivity: High Magnitude: Negligible Significance: Slight Short-term, Slight negative effects
Grey wagtail (Medium)	Grey wagtail were rarely recorded during the breeding bird seasons between 2019 and 2024, only recorded along the Lower River Shannon. No nests were located in the immediate area, but it is considered that this pair was likely to have bred locally. Given the short-term nature of the construction works, the sub-optimal nature of the habitats within the proposed 38 kV Uprate Works and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of habitat loss and fragmentation is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Herring gull (Low)	Herring gull were infrequently recorded during the breeding bird seasons between 2019 and 2024. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Kestrel (Medium)	This species was found to be present foraging within the environs of the proposed 38 kV Uprate Works during the breeding surveys from 2019 to 2024. No potential nest sites were identified. Given the short-term duration of the construction works, the species' use of varied habitats, and the availability of similar suitable habitats in the wider surroundings, the magnitude of the impact is assessed to be low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Kingfisher (Medium)	The majority of habitats within the proposed 38 kV Uprate Works are terrestrial habitats and provide little or no suitable breeding habitat and are sub-optimal for foraging for kingfisher. Surveys carried out during the summer months recorded this species foraging on Parteen Basin and the Lower River Shannon between 2019 and 2024. Given construction effects would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Lapwing (Medium)	Lapwing were only encountered on one occasion and no evidence of breeding was observed during the breeding bird surveys between 2019 and 2024. The Construction Phase would occur during the wintering season, however, it would be short-term in duration. This species is expected to use these habitats post construction. The magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Lesser black-backed gull (Low)	Lesser black-backed gull were frequently observed during the 2019 to 2024 breeding, where they were recorded commuting towards Parteen Basin or in the direction of the Shannon Estuary without landing in the study area. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Mallard (Low)	Mallard was frequently recorded during VP surveys at O'Briensbridge during the breeding bird seasons between 2019 and 2024. The majority of these flights were of birds commuting towards Parteen Basin or in the direction of the Shannon Estuary, with only a few records landing in the study area to feed and roost. Given the usage of the area by this species, the short-term nature of the construction works, the temporary nature of the access tracks, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant negative effects
Meadow pipit (Medium)	Meadow pipit was commonly encountered in wet grassland habitats. Breeding was confirmed at two separate locations in 2019. Both occurrences were noted in the surrounding fields between polesets 53B and 55B, in the fields between the Headrace and the Lower River Shannon. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. adjacent wet grasslands), there is limited potential for ecologically significant habitat loss and fragmentation effects on this species, therefore, the magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Mute swan (High)	Mute swans were frequently observed throughout the breeding seasons between 2019 and 2024 along the Lower River Shannon at O'Briensbridge. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), there is limited potential for ecologically significant habitat loss and fragmentation on this species, therefore, the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Short-term, Not Significant negative effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Redshank (Medium)	Redshank were recorded rarely during the breeding bird seasons between 2019 and 2024. Given usage of the area by this species, the short-term nature of the construction works, the temporary nature of the access tracks, the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment) and with the records likely being birds which were on migration to breeding grounds, the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Snipe (Medium)	The construction of the proposed 38 kV Uprate Works may result in a short-term loss of snipe breeding and foraging habitat locally. This species was rarely recorded during the breeding bird season between 2019 and 2024. Given the short-term nature of the construction works, the temporary nature of the access tracks, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Other Species of Low Conservation Significance (as listed in Table 8.46) (Medium to Very Low)	The construction of the proposed 38 kV Uprate Works may result in a short-term loss of breeding habitat for several species. Based on consistent survey efforts from 2019 to 2024, breeding was confirmed or assumed for these species (Appendix A8.21: Breeding Bird Surveys Summary Report). Certain Green and Amber Listed (BoCCI) passerine species rely on hedgerows within and around the proposed 38 kV Uprate Works for breeding. The removal of hedgerows during construction would reduce the availability of suitable breeding habitat for these species. Species such as house martin, house sparrow, starling, swift, and swallow are unlikely to be significantly affected, as their nesting ecology primarily involves buildings or other man-made structures, no suitable examples of which will be removed during construction. Given that the Construction Phase would be short-term, the proportionately small footprint of the proposed 38 kV Uprate Works, the presence of an existing OHL, that existing hedgerows within and outside the Proposed Project area would remain undisturbed, and the availability of alternative habitats in the wider surroundings, the magnitude of habitat loss and fragmentation impacts is assessed to be of low concern.	Sensitivity: Medium to Very Low Magnitude: Low Significance: Slight to Imperceptible Short-term, Slight to Imperceptible negative effects

Note: * Percival Significance Evaluation is calculated as a product of the sensitivity (Table 8.19) of the species and the magnitude (Table 8.20) of the effect.

8.5.4.1.2 *Habitat Degradation as a Result of Reduced Quality of Foraging Habitat*

753. Similarly to other major infrastructure projects which include works within or across water bodies, the Construction Phase could potentially have a negative impact on water quality in the absence of control measures or mitigation. A wide range of environmental factors are required to support water bird species, including good water quality and clarity, good supply of food resources, and suitable breeding sites. Thus, a reduction of water quality during the Construction Phase could result in a reduction in the availability of suitable habitat for water bird species. Without appropriate mitigation measures in place, a reduction in water quality could potentially have significant ecological effects. These effects would vary with species, habitat choice, life-cycle, breeding status, range, and with the duration of construction activities. The potential effects associated with a possible reduction in water quality due to construction activities are only likely to occur during the Construction Phase. These effects are therefore considered to be short-term in duration.
754. Potential impacts on water quality as a result of the construction of the Proposed Project include:
- Increased sediment load
 - Oil effects on bankside habitat, amenity and surface features followed by pollution of the water column as oil degrades
 - Pollution of the water column from chemical discharge.
755. These impacts may occur as results of:
- Damming and working in the watercourses
 - Silt-laden runoff from construction works
 - Accidental spillage of oil and/or chemicals
 - In cases where a watercourse would be crossed using trenchless excavation, there is potential for a 'breakout' of bentonite drilling fluid (a fine suspended solids) (Chapter 9: Water).
756. As is described in Chapter 5 (Construction & Commissioning), there are two approaches to watercourse crossings: trenchless or open-cut. Potential effects are associated with both techniques:
- In the case of trenchless crossings, there is potential for a 'breakout' of bentonite drilling fluid, in effect, a slurry of very fine suspended solids. If a pathway exists, and in the absence of control measures or mitigation, this slurry could enter a watercourse and result in an increased sediment load. In practice there is very low probability of this occurring
 - In the case of open-cut crossings, two approaches are identified: fluming and over-pumping. Both techniques require the watercourses to be dammed. This could result in the build-up of silt behind the damming structure. During reinstatement, this silt could be released and result in a sudden increase in sediment load to the downstream river.
757. Spillages, into either the dammed or dry riverbed areas, of miscible (capable of being mixed in water in this case) substances (e.g. pesticides), immiscible substances (e.g. oil), and concrete and other cements, in the absence of mitigation, have the potential to impact water quality even in small quantities. Further details on the potential impacts on surface water quality are addressed in Chapter 9 (Water).
758. Table 8.68 assesses the potential effect of a reduction in water quality on KER avian ecological receptor species observed within the Proposed Project. The methodology of the assessment of the impact of a reduction in water quality follows Percival (2003) and EPA (2022), as discussed in Section 8.2.7.

Table 8.68: Assessing the Potential Pre-Mitigation Effects of Habitat Degradation During the Construction Phase on Breeding Bird Key Ecological Receptors as a Result of the Proposed Project

Key Ecological Receptor (Sensitivity)	Survey Results	Pollutants (Magnitude)	Significance Evaluation*
Barn owl (Medium)	This species was recorded foraging on three occasions during the 2016 and 2024 surveys in the breeding bird season. It was also recorded breeding within the boundary of the Proposed Project as an incidental record during bat surveys in 2025. The species was not typically found near watercourses or wetlands and is not likely to be dependent on potentially impacted habitats.	Indirect impacts on water birds may occur as a result of increased sediment load and/or accidental spillage of oil and/or chemicals to receiving watercourses and water bodies within the Proposed Project during the Construction Phase. This could have an indirect short-term impact on water birds as it is likely to reduce the quality of their foraging habitat (i.e. indirectly affect water birds through a loss of available food resources (aquatic prey)). An extreme pollution event (e.g. large oil or chemical spill) could cause mortality of water birds in the immediate environs or have a negative effect on their health. In the absence of best practice design and mitigation, there is a probable chance of increased sediment load and/or accidental spillage impacts occurring. The magnitude of such events would impact KER species differently depending on ecology and life cycles; therefore, the magnitude of the impact is assessed to range from negligible to medium concern.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Black-headed gull (High)	Lough Ourna, County Tipperary hosts a large colony of breeding black-headed gulls annually (Appendix A8.21: Breeding Bird Surveys Summary Report). A maximum site count of 300 individuals was recorded in April 2019. This flock constitutes a flock of national importance (61 pairs or greater constitutes a flock of national importance). Black-headed gulls were also recorded foraging other large bodies of open water, including Parteen Basin.		Sensitivity: High Magnitude: Medium Significance: Significant Short-term, Significant negative effects
Coot (High)	This species was regularly recorded at Parteen Basin and in a number of wetland habitats near bog complexes in Counties Offaly and Kildare.		Sensitivity: High Magnitude: Medium Significance: Significant Short-term, Significant negative effects
Curlew (High)	Curlew were recorded on five occasions between May and June 2016 at Boolagelagh, North Tipperary, Loughourna, North Tipperary, Derryarroe, County Kildare and Castledillon Upper, County Kildare (twice). A flock of 22 was recorded in May 2016 at Parteen Basin; however, it is considered that these birds were not breeding in the area. In 2017 a pair of Curlew was recorded during the breeding season in late May at Lullybeg, County Kildare (Appendix A8.21: Breeding Bird Surveys Summary Report). This pair was not recorded in subsequent months. Curlew were not recorded during breeding bird surveys from 2018 up to 2024.		Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Great crested grebe (High)	Great crested grebe were limited in their distribution during the breeding bird seasons between 2016 and 2024. They were only recorded at Parteen Basin and Lough Ourna in County Tipperary and were scarcely recorded elsewhere. Breeding was confirmed at Lough Ourna during 2016, 2017, 2018, 2019, 2021 and 2022; the majority of these records related to a single pair recorded on a nest.		Sensitivity: High Magnitude: Medium Significance: Significant Short-term, Significant negative effects
Grey wagtail (Medium)	Grey wagtail was recorded infrequently, often on or near watercourses along the Proposed Project. Records often related to commuting or feeding individuals; however, breeding was confirmed or assumed probable in 2017 near Killaloe Bridge, County Clare and in 2018 near Killurane, County Tipperary.		Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects

Key Ecological Receptor (Sensitivity)	Survey Results	Pollutants (Magnitude)	Significance Evaluation*
Hen harrier (High)	Hen harrier was rarely recorded during the breeding bird surveys between 2016 and 2024. The species was only recorded twice: once in 2018 near Timahoe, County Kildare and a second in 2019 near Cloughjordan, County Tipperary. No evidence of breeding hen harrier was recorded during the breeding bird surveys between 2016 and 2024. The species was not typically found near watercourses or wetlands and is not likely to be dependent on potentially impacted habitats.	Indirect impacts on water birds may occur as a result of increased sediment load and/or accidental spillage of oil and/or chemicals to receiving watercourses and water bodies within the Proposed Project during the Construction Phase. This could have an indirect short-term impact on water birds as it is likely to reduce the quality of their foraging habitat (i.e. indirectly affect water birds through a loss of available food resources (aquatic prey)). An extreme pollution event (e.g. large oil or chemical spill) could cause mortality of water birds in the immediate environs or have a negative effect on their health. In the absence of best practice design and mitigation, there is a probable chance of increased sediment load and/or accidental spillage impacts occurring. The magnitude of such events would impact KER species differently depending on ecology and life cycles; therefore, the magnitude of the impact is assessed to range from negligible to medium concern.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Short-term, Not Significant negative effects
Kestrel (Medium)	Kestrel was regularly recorded during the breeding bird surveys between 2016 and 2024. The majority of these records related to commuting, hunting or roosting individuals. Breeding was confirmed on two occasions only in 2018, one recorded at Derrycrib, County Kildare where an adult was observed carrying prey in suitable breeding habitat and one at Ballyanny, County Tipperary when a pair of adults were observed mobbing a buzzard in suitable breeding habitat. No nest sites were located at either of these locations and it is unknown if the recorded birds breed successfully. The species was not typically found near watercourses or wetlands and is not likely to be dependent on potentially impacted habitats.		Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Kingfisher (Medium)	Kingfisher were recorded to have bred at one location during the 2016 surveys and at two locations during the 2017 surveys. For both these records it is unknown if breeding was successful. In follow up visits in the following survey seasons up to 2024 no breeding activity was recorded at these sites again; any kingfisher records during these times related only to commuting individuals.		Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects
Lapwing (Medium)	Lapwing were probable or confirmed to have bred along the Proposed Project during the 2016, 2017, 2018, 2019, 2021 and 2022 breeding seasons. All behavioural observations associated with breeding (display flights, alarm calling and/or a pair holding a territory) were noted in peatland habitats. These breeding lapwing records were principally confined to the large bog complexes along the Proposed Project in Counties Offaly and Kildare.		Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Mallard (Low)	Mallard was frequently recorded during the 2016 to 2024 breeding seasons, often on large water bodies or ponds and near wetland areas along the Proposed Project. Breeding was confirmed at a number of locations, the majority of which were recorded on large water bodies such as Parteen Basin and Lough Ourna, County Tipperary, but also breeding on a number of pool/ponds within bogs in Counties Offaly and Kildare.		Sensitivity: Low Magnitude: Medium Significance: Slight Short-term, Slight negative effects

Key Ecological Receptor (Sensitivity)	Survey Results	Pollutants (Magnitude)	Significance Evaluation*
Meadow pipit (Medium)	Meadow pipit were regularly encountered during the breeding bird seasons between 2016 and 2024. Records were often located in wet grassland habitats and cutover bogs along the Proposed Project. No breeding was confirmed for these ground nesting birds during the survey seasons, but breeding was probable and possible during all survey years. The species was not typically found near watercourses or wetlands and is not likely to be dependent on potentially impacted habitats.	Indirect impacts on water birds may occur as a result of increased sediment load and/or accidental spillage of oil and/or chemicals to receiving watercourses and water bodies within the Proposed Project during the Construction Phase. This could have an indirect short-term impact on water birds as it is likely to reduce the quality of their foraging habitat (i.e. indirectly affect water birds through a loss of available food resources (aquatic prey)). An extreme pollution event (e.g. large oil or chemical spill) could cause mortality of water birds in the immediate environs or have a negative effect on their health. In the absence of best practice design and mitigation, there is a probable chance of increased sediment load and/or accidental spillage impacts occurring. The magnitude of such events would impact KER species differently depending on ecology and life cycles; therefore, the magnitude of the impact is assessed to range from negligible to medium concern.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Mute swan (High)	Mute swan were limited in their distribution during the breeding bird season between 2016 and 2024. They were only recorded breeding at Parteen Basin, County Tipperary and were scarcely recorded breeding elsewhere. The only breeding record outside Parteen Basin was in 2016 when a pair was confirmed to have bred at Ardcroney County Tipperary, when a chick and adult were observed.		Sensitivity: High Magnitude: Medium Significance: Significant Short-term, Significant negative effects
Peregrine falcon (Medium)	Peregrine falcon was recorded infrequently during the breeding bird surveys between 2016 and 2024. The majority of records relate to commuting or hunting individuals where no breeding activity was recorded. A breeding pair was observed in 2021 and 2022 at the Edenderry Power Station near Cushaling, County Offaly; breeding was recorded at this site in the past. The species was not typically found near watercourses or wetlands and is not likely to be dependent on potentially impacted habitats.		Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Ringed plover (Low)	Ringed plover was rarely recorded during the breeding seasons between 2016 and 2024. A pair was recorded once on cutover raised bog near Island, County Offaly. The pair was observed in suitable breeding habitat during the breeding season in May 2021, implying breeding was probable. However, in the following visit, in June 2021, the pair was not seen again. It unknown if this pair nested or if they were successful. In 2022 there were ten recordings of breeding ringed plover including two confirmed, five probable and one possible breeding. The records were mainly in County Offaly, with one record in County Kildare.		Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant negative effects
Sand martin (Low)	Sand martin was regularly encountered throughout the Proposed Project. The largest congregations of foraging individuals were associated with large water bodies: Parteen Basin and Lough Ourna, County Tipperary. Breeding was either confirmed, probable or possible in the years 2016, 2017, 2018, 2019, 2021 and 2022, with records confined to Counties Tipperary and Offaly. The distribution of this species is largely dependent on habitat availability such as soft sediment banks. During the breeding bird surveys, these habitats were present in sand banks in County Tipperary and the peaty banks and active quarries in County Offaly.		Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant negative effects

Key Ecological Receptor (Sensitivity)	Survey Results	Pollutants (Magnitude)	Significance Evaluation*
Snipe (Medium)	Snipe were recorded regularly in wet grassland and peatland habitats along the Proposed Project. Records of breeding snipe were distributed across eight main areas along the Proposed Project: Parteen Basin in County Tipperary, Island, Rathlumber, Cushaling and Lullybeg to Ticknevin in County Offaly, and Timahoe East and Derryvarroge in County Kildare. This species is a probable breeder within the Proposed Project, although no nest sites were located for the species. Since 2019, a significant decrease in snipe observations within the Proposed Project has been noted. The specific reason for this is unknown but the species has been recorded undergoing significant short and long-term declines in Ireland (Gilbert <i>et al.</i> 2021). In 2021 and 2022 the number of recordings increased with 21 breeding records noted in 2021 and 23 in 2022.	Indirect impacts on water birds may occur as a result of increased sediment load and/or accidental spillage of oil and/or chemicals to receiving watercourses and water bodies within the Proposed Project during the Construction Phase. This could have an indirect short-term impact on water birds as it is likely to reduce the quality of their foraging habitat (i.e. indirectly affect water birds through a loss of available food resources (aquatic prey)). An extreme pollution event (e.g. large oil or chemical spill) could cause mortality of water birds in the immediate environs or have a negative effect on their health. In the absence of best practice design and mitigation, there is a probable chance of increased sediment load and/or accidental spillage impacts occurring. The magnitude of such events would impact KER species differently depending on ecology and life cycles; therefore, the magnitude of the impact is assessed to range from negligible to medium concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Woodcock (Medium)	Within the Proposed Project, woodcock was confined to surveyed woodland and scrub sites of Incha Beg County Tipperary, and Derrinturn, Cloona and Derrycrib, County Kildare. This species is considered a probable breeder within the Proposed Project, although no nest sites were located. The species was not typically found near watercourses or wetlands and is not likely to be dependent on potentially impacted habitats.		Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Yellowhammer (Medium)	Yellowhammer was recorded frequently during the breeding bird season between 2016 and 2024. No breeding activity was confirmed during the survey period, but the species was often recorded within suitable breeding habitat or males heard calling, indicating a possible breeding status. The species was not typically found near watercourses or wetlands and is not likely to be dependent on potentially impacted habitats.		Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Other Species of Low Conservation Significance (as listed in Table 8.44) (Medium to Very Low)	A large number of other species of low conservation significance were recorded during the breeding bird surveys conducted between 2016 and 2024 (Appendix A8.21: Breeding Bird Surveys Summary Report). However, only a few of these species are considered dependent on wetland or aquatic habitats during the breeding season, namely grey heron, greylag goose, little grebe, dipper, little egret, and water rail. The remaining species were not typically found near watercourses or wetlands and are unlikely to rely on potentially impacted habitats. Among the recorded wetland species, only little grebe was confirmed as breeding, with its nesting activity confined to large water bodies and ponds in wetland areas and bogs in Counties Offaly and Kildare.		Sensitivity: Medium to Very Low Magnitude: Low to Negligible Significance: Slight to Imperceptible Short-term, Slight to Imperceptible negative effects

Note: * Percival Significance Evaluation is calculated as a product of the sensitivity (Table 8.19) of the species and the magnitude (Table 8.20) of the effect.

8.5.4.1.3 *Disturbance/Displacement*

759. Effective habitat loss through species disturbance/displacement can occur as a result of construction activities such as movement of machinery and the associated noise and disturbance associated with the presence of construction staff. Disturbance/displacement to birds can have negative impacts to individuals or populations of bird species, including reduction in body condition due to lack of available feeding areas, increased energy expenditure by fleeing birds, or the reduction or predation of nests (Price 2008). Studies have investigated this observation; the magnitude of the effect has been found to vary with species, breeding status, and with the availability of alternative habitat nearby (Ruddock and Whitfield 2007). These studies have been conducted within various habitat types including upland, coastal and offshore wind farm sites. Although the results of such studies have been shown to vary, it remains clear that under particular circumstances some displacement can occur. Without appropriate mitigation measures in place, construction activities have the potential to result in likely significant negative effects.
760. Within the Proposed Project, potential disturbance/displacement effects may occur during the Construction Phase. These effects would vary with species, habitat choice, breeding status, range and with the duration of the construction works. Potential disturbance/displacement effects would be felt for the duration of construction works only. As mentioned, the duration of the Construction Phase is estimated to be five years; however, the construction of the pipeline would be conducted in manageable lengths to ensure that disruption to individual landowners would be minimised and to minimise the duration that an area is exposed to construction works. It is therefore reasonable to conclude that a section of land exposed to construction activity (associated with pipeline installation) would be reinstated within 24 months; therefore, potential disturbance/displacement effects are expected to be short-term in duration.
761. Table 8.69 assesses the potential effects of disturbance/displacement on the key breeding avian ecological receptor species as a result of the Proposed Project (excluding the 38 kV Uprate Works), while Table 8.70 assesses the potential effect of disturbance/displacement on KER avian ecological receptor species as a result of the proposed 38 kV Uprate Works. The methodology of the assessment of the impact of habitat loss and fragmentation follows (Percival 2003) and (EPA 2022), as discussed in Section 8.2.7.

Table 8.69: Assessing the Potential Pre-Mitigation Effects of Disturbance/Displacement During the Construction Phase on Breeding Key Ecological Receptors as a Result of the Proposed Project

Key Ecological Receptor (Sensitivity)	Disturbance/Displacement (Magnitude)	Significance Evaluation*
Barn owl (Medium)	This species was recorded foraging on three occasions during the 2016 and 2024 breeding bird surveys and was confirmed to be breeding as an incidental record during a bat survey in 2025. This confirmed breeding record was recorded within the boundary of the Proposed Project and as such will be subject to disturbance and displacement. The majority of construction activities are not expected to result in likely significant effects for this species in the short-term, at any geographic scale. Low numbers of this species were recorded along the Proposed Project or within habitats surrounding the Proposed Project. However, the presence of a confirmed breeding pair in 2025, contained within the boundary of the Proposed Project, will be greatly impacted. When considering the short-term nature of the construction works, and the availability of similar suitable habitats in the wider surroundings, and the presence of a breeding pair, the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects
Black-headed gull (High)	Lough Ourna, County Tipperary hosts a large colony of breeding black-headed gulls annually (Appendix A8.21: Breeding Bird Surveys Reports). A maximum site count of 382 individuals was recorded in 2022. This flock constitutes a flock of national importance (61 pairs or greater constitutes a flock of national importance). The Proposed Project is approximately 0.7km to the west of Lough Ourna. It is considered that the distance of the black-headed gull colony from the Proposed Project and the short-term duration of construction works limits the potential for ecologically significant effects. The magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Coot (High)	Various habitats in and surrounding Parteen Basin (where the proposed RWI&PS site is located) are used by breeding coot. This species was regularly recorded at Parteen Basin during the breeding bird surveys between 2016 and 2024, most often in fringing habitat on the western shore. 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 on coot. Given the short-term duration of the construction works, the width of the Parteen Basin, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Permanent, Slight negative effects
Curlew (High)	Habitats which would fall within the Proposed Project are considered sub-optimal breeding and foraging habitat for curlew. Based on a consistent survey effort from 2016 to 2024 this species was recorded infrequently in low numbers within the Proposed Project during the breeding bird surveys. There was no evidence that breeding activity was attempted or occurred or within the study area. Non-breeding or migrating curlew were occasionally recorded on fringing habitat surrounding the Proposed Project. Individuals displaced from fringing habitats as a result of disturbance effects associated with construction activities are expected to return following the completion of construction in the affected area. Therefore, the magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Great crested grebe (High)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide no suitable breeding habitat for great crested grebe. This species was primarily recorded foraging on Parteen Basin and Lough Ourna. The species was recorded breeding at Lough Ourna from 2016 to 2024. Disturbance effects to great crested grebe have been recorded to occur at distances up to 100m (Keller 1989). Given the breeding records at Lough Ourna are greater than 1.5km from the Proposed Project, the short-term nature of the construction works, the unsuitability of the majority of habitats within the Proposed Project for this species, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Grey wagtail (Medium)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide no suitable breeding habitat for grey wagtail. This species was primarily recorded along watercourses and large water bodies along the Proposed Project. The species was recorded breeding at Killaloe, County Clare in 2017 and along a river near Kilurane County Tipperary from 2016 to 2024. These breeding records were located outside the footprint of the Proposed Project. Given the short-term nature of the construction works, the unsuitability of the majority of habitats within the Proposed Project for this species, and the availability of alternative habitats in the wider surroundings (i.e. upstream and downstream of rivers), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects

Key Ecological Receptor (Sensitivity)	Disturbance/Displacement (Magnitude)	Significance Evaluation*
Hen harrier (High)	According to Bright <i>et al.</i> (2006) displacement of hen harrier can occur up to 500m around a construction site. No nest sites were recorded for this species within 500m of the Proposed Project. This species was found to use the wider surroundings of the Proposed Project infrequently for roosting. Therefore, no direct loss of nesting habitat is expected as a result of disturbance/displacement effects. Given the short-term duration of the Construction Phase, the wide-ranging nature of this species, and the availability of similar suitable habitats in the surroundings, the magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Kestrel (Medium)	Disturbance/displacement associated with construction activities is not expected to result in likely significant effects for this species in the short-term, at any geographic scale. Low numbers of nest sites were located for this species along the Proposed Project or within habitats surrounding the Proposed Project. This species' widespread breeding distribution limits the potential for likely significant effects. Given the short-term duration of construction works, the low number of observations, and the availability of similar suitable habitats in the wider surroundings, the magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Kingfisher (Medium)	The majority of habitats within the Proposed Project are terrestrial habitats and provide little or no suitable breeding habitat and are sub-optimal for foraging for kingfisher. Surveys carried out between 2016 and 2024 recorded this species year round, primarily foraging on Lough Derg, Parteen Basin and at other wetland sites within the Proposed Project. The western shoreline of Parteen Basin provides overhanging vegetation favoured by foraging kingfisher. By contrast, a large portion of the eastern shoreline is composed of a modified embankment and is unfavourable for foraging kingfisher. It is proposed to construct the RWI&PS on the eastern shoreline. In 2016, a kingfisher nest site was located within the Proposed Project near Castledillon Upper, County Kildare along the River Liffey (Appendix A8.21: Breeding Bird Surveys Summary Report). In 2017 an additional nest site was located within the Proposed Project at Cloghanmore, County Offaly along the Camcor River (Appendix A8.21: Breeding Bird Surveys Summary Report). It is proposed to cross both of these rivers by trenchless excavation (Chapter 5: Construction & Commissioning). Therefore, nest sites at these locations would be disturbed as a result of the construction of the Proposed Project but would not be directly affected. Given construction effects would be short-term in duration, this species is expected to use these habitats post construction. Therefore the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects
Lapwing (Medium)	Based on a consistent survey effort from 2016 to 2024, the most noteworthy observations of lapwing were made during the breeding season. This species is therefore most vulnerable to the potential for disturbance impacts associated with construction activities during the spring/summer months. Disturbance/displacement was found by Hötter <i>et al.</i> (2006) to be dependent on the availability of similar suitable habitat within the wider surroundings. These breeding lapwing records were principally confined to a large bog complex surrounding the Proposed Project particularly to the south and east of Daingean, County Offaly (Appendix A8.21: Breeding Bird Surveys Summary Report). This species is considered to be dependent on these peatland habitats surrounding the Proposed Project for breeding. Thus, the construction of the Proposed Project could result in effective habitat loss through disturbance/displacement at this location. Given Construction Phase would be short-term in duration, the species is expected to use these habitats post construction. Therefore the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects
Mallard (Low)	Mallard was frequently recorded during the 2016 to 2024 breeding seasons, often on large water bodies or ponds and near wetland areas along the Proposed Project. Breeding was confirmed at a number of locations, the majority of which were recorded on large water bodies such as Parteen Basin and Lough Ourna, County Tipperary, but also breeding on a number of pool/ponds within bogs in Counties Offaly and Kildare. Given the short-term nature of the construction works, the unsuitability of the majority of habitats within the Proposed Project for this species, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant negative effects

Key Ecological Receptor (Sensitivity)	Disturbance/Displacement (Magnitude)	Significance Evaluation*
Meadow pipit (Medium)	The construction of the Proposed Project would result in a short-term loss of meadow pipit breeding habitat locally. Based on a consistent survey effort from 2016 to 2024, the most noteworthy observations of meadow pipit were made during the breeding season. The majority of these breeding meadow pipit records were confined to a large bog complex within and surrounding the Proposed Project in Counties Offaly and Kildare as well as wet grasslands and meadows in County Tipperary (Appendix A8.21: Breeding Bird Surveys Summary Report). The construction of the Proposed Project would result in a land-take which would consequently reduce the availability of local habitat for breeding meadow pipit. Given the Construction Phase would be short-term in duration, this species is expected to use these habitats post-construction. Therefore, the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects
Mute swan (High)	Various habitats in and surrounding Parteen Basin (where the proposed RWI&PS site is located) are used by breeding mute swan. This species was consistently recorded at Parteen Basin during the breeding bird season between 2016 and 2024. This species was most often recorded in fringing habitat on the western shore. 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 on mute swan. Given the short-term duration of the construction works, the width of the Parteen Basin, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Permanent, Slight negative effects
Peregrine falcon (Medium)	The majority of habitats within the Proposed Project are sub-optimal breeding habitat for peregrine falcon. A nest site was recorded near the Proposed Project, at the Edenderry Power Station, County Offaly (greater than 1km from the Proposed Project). This species was recorded foraging within the environs of the Proposed Project during surveys carried out between 2016 and 2024. Given the short-term duration of the construction works, the species' use of varied habitats, and the availability of similar suitable habitats in the wider surroundings, the magnitude of the disturbance impacts is assessed to be low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Ringed plover (Low)	Based on a consistent survey effort from 2016 to 2024, the most noteworthy observations of ringed plover were made during the breeding season. These breeding ringed plover records were principally confined to a large bog complexes surrounding the Proposed Project, particularly to the south and east of Daingean County Offaly (Appendix A8.21: Breeding Bird Surveys Summary Report). This species is considered to be dependent on these peatland habitats surrounding the Proposed Project for breeding. Thus, the construction of the Proposed Project could result in effective habitat loss through disturbance/displacement at these locations. Given the Construction Phase would be short-term in duration, the species is expected to use these habitats post construction. Therefore the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Low Magnitude: Medium Significance: Slight Short-term, Slight negative effects
Sand martin (Low)	During breeding bird surveys between 2016 and 2024, sand martin was found to use peat banks for breeding in several locations and a number of nests were located along the Proposed Project (Appendix A8.21: Breeding Bird Surveys Summary Report). The largest breeding colony of 100 nests was recorded in 2019 in Kilcolman, County Offaly. It is therefore considered likely that some sand martin breeding habitat would be disturbed as a result of the construction of the Proposed Project. Given construction impacts would be short-term in duration, the species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant negative effects
Snipe (Medium)	Several breeding snipe territories were recorded within the Proposed Project. The majority of these breeding snipe were confined to a large bog complex which surrounds the Proposed Project in Counties Offaly and Kildare (Appendix A8.21: Breeding Bird Surveys Summary Report). This species is considered to be dependent on these peatland habitats surrounding the Proposed Project for breeding. Outside of this location, the number of breeding territories was found to be low. However, this species has a widespread distribution throughout the country. Given construction effects would be short-term in duration, the species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects

Key Ecological Receptor (Sensitivity)	Disturbance/Displacement (Magnitude)	Significance Evaluation*
Woodcock (Medium)	Based on a consistent survey effort from 2016 to 2024, the most noteworthy observations of woodcock were made during the breeding season. The majority of these breeding woodcock records were principally confined to a large bog complex surrounding the Proposed Project approximately 5km south of Enfield, County Kildare. Species-specific surveys did not locate any nest sites within the Proposed Project. Woodcock was found to only use a small portion of the Proposed Project, in low numbers. Furthermore, the wider surroundings contain similar suitable habitat. Therefore, disturbance/displacement associated with construction activities is not expected to result in significant effects for this species in the short-term. Therefore, the magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Yellowhammer (Medium)	The construction of the Proposed Project would result in a short-term loss of yellowhammer breeding habitat locally. Based on a consistent survey effort from 2016 to 2024, the most noteworthy observations of yellowhammer were made during the breeding season. These breeding yellowhammer records were confined to the easterly portion of the Proposed Project; however, in 2018 and 2019 recordings were more evenly spread throughout the Proposed Project. These records were typically found in hedgerows and strongly linked to areas where cereal crops were in cultivation (Appendix A8.21: Breeding Bird Surveys Summary Report). Hötter <i>et al.</i> (2006) found disturbance/displacement to be dependent on the availability of similar suitable habitat within the wider surroundings. This species is considered to be dependent on hedgerows for breeding and is strongly linked to areas where cereal crops were in cultivation. Thus, the construction of the Proposed Project could result in effective habitat loss through disturbance/displacement in these areas. Given the Construction Phase would be short-term in duration, the abundance of existing hedgerow outside the Proposed Project would remain undisturbed, and that majority of removed hedgerow is to be replanted, the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term (breeding habitat loss), Moderate negative effects
Other Species of Low Conservation Significance (as listed in Table 8.44) (Medium to Very Low)	The construction of the Proposed Project would result in a short-term loss of breeding habitat locally due to disturbance and displacement effects. Based on consistent survey efforts from 2016 to 2024, breeding was confirmed or assumed for some species categorised as being of low conservation significance (Appendix A8.21: Breeding Bird Surveys Summary Report). Some green and amber listed (BoCCI) passerine species rely on hedgerows, scrub, and agricultural fields within and around the Proposed Project for breeding. Construction related disturbance would reduce the availability of suitable breeding habitat for these species. However, Hötter <i>et al.</i> (2006) found that disturbance and displacement effects depend on the availability of similar suitable habitats in the surrounding landscape. Since most of the habitat affected by the Proposed Project is also present in the wider area, significant effects on these breeding species are unlikely. Additionally, some of the other recorded species were observed only rarely or in low numbers and are not considered dependent on the habitat within the Proposed Project area. Species such as house martin, house sparrow, starling, swift, and swallow are also unlikely to be significantly affected, as their nesting ecology primarily involves buildings or other man-made structures, none of which will be removed or disturbed during construction or within the immediate vicinity of the works. Given that the Construction Phase will be short-term, that suitable breeding and foraging habitat outside the project area will remain undisturbed and that some species will not experience any disturbance effects, the overall magnitude of impact on these species of low conservation significance is assessed to be low.	Sensitivity: Medium to Very Low Magnitude: Low Significance: Slight to Imperceptible Short-term, Slight to Imperceptible negative effects

Note: * Percival Significance Evaluation is calculated as a product of the sensitivity (Table 8.19) of the species and the magnitude (Table 8.20) of the effect

Table 8.70: Assessing the Potential Pre-Mitigation Effects of Disturbance/Displacement During the Construction Phase on Breeding Bird Key Ecological Receptors as a Result of the 38 kV Uprate Works

Key Ecological Receptor (Sensitivity)	Disturbance and Displacement (Magnitude)	Significance Evaluation*
Black-headed gull (High)	The foraging and commuting of this species may be disturbed as a result of the construction of the proposed 38 kV Uprate Works. Given construction impacts would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of medium concern.	Sensitivity: High Magnitude: Medium Significance: Significant Short-term, Significant negative effects
Common gull (Low)	This species was recorded only once commuting along the Lower River Shannon as it flew between Parteen Basin and the River Fergus/Shannon Estuary and foraging on the Lower River Shannon. The foraging and commuting of this species may be disturbed as a result of the construction of the proposed 38 kV Uprate Works. Given construction impacts would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Low Magnitude: Medium Significance: Slight Short-term, Slight negative effects
Coot (High)	Disturbance/displacement was found by (Hötter <i>et al.</i> 2006) to be dependent on the availability of similar suitable habitat within the wider surroundings. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), along with the temporary disturbance from the installation of access tracks, the magnitude of the impacts is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Cormorant (Very High)	The majority of habitats within the proposed 38 kV Uprate Works are terrestrial habitats and provide little or no suitable breeding habitat and are sub-optimal for foraging for cormorant. The foraging and commuting of this species may be disturbed as a result of the construction of the proposed 38 kV Uprate Works. Given construction impacts would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Very High Magnitude: Medium Significance: Significant Short-term, Significant negative effects
Curlew (High)	The potential exists for this species to experience disturbance effects in winter months during construction works. Individuals displaced from fringing habitats as a result of disturbance effects associated with construction activities are expected to return following the completion of construction in the affected area. Therefore, the magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Grey wagtail (Medium)	The potential exists for this species to experience disturbance effects in winter months during construction works. Individuals displaced from fringing habitats as a result of disturbance effects associated with construction activities are expected to return following the completion of construction in the affected area. Therefore, the magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects

Key Ecological Receptor (Sensitivity)	Disturbance and Displacement (Magnitude)	Significance Evaluation*
Herring gull (Low)	This species was most often recorded commuting along the Lower River Shannon as it flew between Parteen Basin and the River Fergus/Shannon Estuary, and foraging on the Lower River Shannon. The foraging and commuting of this species may be disturbed as a result of the construction of the proposed 38 kV Uprate Works. Given construction impacts would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Low Magnitude: Medium Significance: Slight Short-term, Slight negative effects
Kestrel (Medium)	Disturbance/displacement associated with construction activities is not expected to result in likely significant effects for this species in the short-term, at any geographic scale. This species' widespread breeding distribution limits the potential for likely significant effects. Given the short-term duration of construction works, the low number of observations, and the availability of similar suitable habitats in the wider surroundings, the magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Kingfisher (Medium)	The foraging and commuting of this species may be disturbed as a result of the construction of the proposed 38 kV Uprate Works. Given construction impacts would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects
Lapwing (Medium)	Disturbance/displacement was found by (Hötter <i>et al.</i> 2006) to be dependent on the availability of similar suitable habitat within the wider surroundings. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), along with the temporary disturbance from the installation of access tracks, the magnitude of the impacts is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Lesser black-backed gull (Low)	This species was most often recorded commuting along the Lower River Shannon as it flew between Parteen Basin and the River Fergus/Shannon Estuary, and foraging on the Lower River Shannon. The foraging and commuting of this species may be disturbed as a result of the construction of the proposed 38 kV Uprate Works. Given construction impacts would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Low Magnitude: Medium Significance: Slight Short-term, Slight negative effects
Mallard (Low)	Mallard was frequently recorded during VP surveys at O'Briensbridge during the breeding bird seasons between 2019 and 2024. The majority of these flights were of birds commuting towards Parteen Basin or in the direction of the Shannon Estuary, with only a few records landing in the study area to feed and roost. Given the usage of the area by this species, the short-term nature of the construction works, the temporary nature of the access tracks, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant negative effects
Meadow pipit (Medium)	Disturbance/displacement was found by (Hötter <i>et al.</i> 2006) to be dependent on the availability of similar suitable habitat within the wider surroundings. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), along with the temporary disturbance from the installation of access tracks, the magnitude of the impacts is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects

Key Ecological Receptor (Sensitivity)	Disturbance and Displacement (Magnitude)	Significance Evaluation*
Mute swan (High)	This species was recorded consistently at O'Briensbridge during the 2019 breeding surveys with confirmed breeding. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), there is limited potential for ecologically significant disturbance/displacement effects on this species, therefore, the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Short-term, Not Significant negative effects
Redshank (Medium)	Disturbance/displacement was found by (Hötter <i>et al.</i> 2006) to be dependent on the availability of similar suitable habitat within the wider surroundings. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), along with the temporary disturbance from the installation of access tracks, the magnitude of the impacts is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Snipe (Medium)	Snipe forage in wetland habitats, which occur occasionally along the proposed 38 kV Uprate Works. However, this species has a widespread distribution throughout the country. Given construction effects would be short-term in duration, the species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects
Other Species of Low Conservation Significance (as listed in Table 8.46) (Medium to Very Low)	The construction of the Proposed Project would result in a short-term loss of breeding habitat locally due to disturbance and displacement effects. Based on consistent survey efforts from 2019 to 2024, breeding was confirmed or assumed for some species categorised as being of low conservation significance (Appendix A8.21: Breeding Bird Surveys Summary Report). Some green and amber listed (BoCCI) passerine species rely on hedgerows, scrub, and agricultural fields within and around the Proposed Project for breeding. Construction related disturbance would reduce the availability of suitable breeding habitat for these species. However, Hötter <i>et al.</i> (2006) found that disturbance and displacement effects depend on the availability of similar suitable habitats in the surrounding landscape. Since most of the habitat affected by the Proposed Project is also present in the wider area, significant effects on these breeding species are unlikely. Additionally, some of the other recorded species were observed only rarely or in low numbers and are not considered dependent on the habitat within the Proposed Project area. Species such as house martin, house sparrow, starling, swift, and swallow are also unlikely to be significantly affected, as their nesting ecology primarily involves buildings or other man-made structures, none of which will be removed or disturbed during construction or within the immediate vicinity of the works. Given that the Construction Phase would be short-term, that suitable breeding habitat outside the project area would remain undisturbed, that most removed hedgerows would be replanted, and that some species would not experience habitat loss, the overall magnitude of impact on these species of low conservation significance is assessed to be low.	Sensitivity: Medium to Very Low Magnitude: Low Significance: Slight to Imperceptible Short-term, Slight to Imperceptible negative effects

Note: * Percival Significance Evaluation is calculated as a product of the sensitivity (Table 8.19) of the species and the magnitude (Table 8.20) of the effect.

8.5.4.2 Breeding Birds – Summary of Effects During Construction

762. Table 8.71 summarises the potential Construction Phase impacts and associated effects on breeding birds. In the absence of mitigation measures there is potential for significant effects.

Table 8.71: Summary of Pre-Mitigation Effects Upon Breeding Birds During Construction of the Proposed Project

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Effect	Potential Significant Effect
Parteen Basin, RWI&PS and the Route of the Treated Water Pipeline					
Barn owl	Red Listed (BoCCI)	Ballyhugh or Springfield and Cangort, County Offaly, Ballyanny, County Tipperary	Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons. Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance. The construction of the Proposed Project could potentially have a negative impact, resulting in a reduction in water quality which could have an indirect impact on water birds. Potential impacts include pollution from the build-up of silt, oil and/or chemical spillage as a result of construction activities in or near watercourses. Furthermore, there is potential for a 'breakout' of bentonite drilling fluid during trenchless water crossings and increases to sediment load as a result of open-cut crossing techniques.	Habitat loss and fragmentation: Short-term, Moderate negative effects Habitat degradation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Moderate negative effect	Yes
Black-headed gull	Amber Listed (BoCCI)	Goat Island (Lough Derg), Parteen Basin and Lough Ourna, County Tipperary, Island, County Offaly		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Significant negative effects Disturbance/displacement: Short-term, Slight negative effects	Yes
Coot	Amber Listed (BoCCI)	Lough Derg, Drumminascart and Lough Ourna, County Tipperary		Habitat loss and fragmentation: Permanent, Not Significant negative effects Habitat degradation: Short-term, Significant negative effects Disturbance/displacement: Permanent, Slight negative effects	Yes
Curlew	Red Listed (BoCCI)	Parteen Basin, Boolagelagh, Lough Ourna, County Tipperary Derryarroge, Lullybeg and Castledillon Upper, County Kildare		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Slight negative effects	No

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Effect	Potential Significant Effect
Great crested grebe	Amber Listed (BoCCI)	Parteen Basin and Lough Ourna, County Tipperary	Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons. Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance. The construction of the Proposed Project could potentially have a negative impact, resulting in a reduction in water quality which could have an indirect impact on water birds. Potential impacts include pollution from the build-up of silt, oil and/or chemical spillage as a result of construction activities in or near watercourses. Furthermore, there is potential for a 'breakout' of bentonite drilling fluid during trenchless water crossings and increases to sediment load as a result of open-cut crossing techniques.	Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Significant negative effects Disturbance/displacement: Short-term, Slight negative effects	Yes
Grey wagtail	Red Listed (BoCCI)	Frequently encountered in along riparian habitat, including River Cushaling, County Offaly and Cloona, County Kildare		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Moderate negative effects Disturbance/displacement: Short-term, Slight negative effects	Yes
Hen harrier	Annex I EC Birds Directive	None identified within the study area but were noted in nearby locations including Shinrone, Kinnitty and Mount Lucas Bog, County Offaly		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Slight negative effects	No
Kestrel	Red Listed (BoCCI)	Lough Derg, Parteen Basin, Carrigatogher, Boolagelagh, Ballyannymore and Ballyanny, County Tipperary Lullybeg and Derrycreeb, County Kildare		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Slight negative effects	No
Kingfisher	Amber Listed (BoCCI)	Lough Derg, Parteen Basin and at other riparian sites within the Proposed Project; including on the River Liffey at Friarstown County Kildare		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Moderate negative effects Disturbance/displacement: Short-term, Moderate negative effects	Yes

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Effect	Potential Significant Effect
Lapwing	Red Listed (BoCCI)	Lough Derg, Ardcroney, Parteen Basin, Gortmore, Incha Beg, Gortmore and Carrigatogher County Tipperary Kilmurryely, Ballycon, Rathlumber and Cloona, County Offaly Drehid Pools, Cloona, Lullymore, Edenderry, Lullybeg and Ticknevin County Kildare	Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons. Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance. The construction of the Proposed Project could potentially have a negative impact, resulting in a reduction in water quality which could have an indirect impact on water birds. Potential impacts include pollution from the build-up of silt, oil and/or chemical spillage as a result of construction activities in or near watercourses. Furthermore, there is potential for a 'breakout' of bentonite drilling fluid during trenchless water crossings and increases to sediment load as a result of open-cut crossing techniques.	Habitat loss and fragmentation: Short-term, Moderate negative effects Habitat degradation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Moderate negative effects	Yes
Mallard	Amber Listed (BoCCI)	Parteen Basin and Lough Ourna, County Tipperary, but also breeding on a number of pool/ponds within bogs in Counties Offaly and Kildare		Habitat loss and fragmentation: Short-term, Not Significant negative effects Habitat degradation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Not Significant negative effects	No
Meadow pipit	Red Listed (BoCCI)	Peatland habitats and wet grassland in Counties Tipperary, Offaly and Kildare		Habitat loss and fragmentation: Short-term, Moderate negative effects Habitat degradation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Moderate negative effects	Yes
Mute swan	Amber Listed (BoCCI)	Lough Derg, Parteen Basin and Lough Ourna, County Tipperary		Habitat loss and fragmentation: Permanent, Not Significant negative effects Habitat degradation: Short-term, Significant negative effects Disturbance/displacement: Permanent, Slight negative effects	Yes
Peregrine falcon	Annex I EC Birds Directive	Ballyanny Lower, County Tipperary, Lullymore and Edenderry Power Station, County Offaly, Newtown, County Kildare		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Slight negative effects	No

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Effect	Potential Significant Effect
Ringed plover	Amber Listed (BoCCI)	Island, Esker Beg and Rathlumber, County Offaly, Derryvarroge, County Kildare	Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons. Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance. The construction of the Proposed Project could potentially have a negative impact, resulting in a reduction in water quality which could have an indirect impact on water birds. Potential impacts include pollution from the build-up of silt, oil and/or chemical spillage as a result of construction activities in or near watercourses. Furthermore, there is potential for a 'breakout' of bentonite drilling fluid during trenchless water crossings and increases to sediment load as a result of open-cut crossing techniques.	Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Slight negative effects	No
Sand martin	Amber Listed (BoCCI)	Common over large water bodies at Parteen Basin and Lough Ourna, County Tipperary. Some breeding activity at Island, Esker Beg, Rathlumber, County Offaly and Derryvarroge, County Kildare		Habitat loss and fragmentation: Permanent, Not Significant negative effects Habitat degradation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Not Significant negative effects	No
Snipe	Red Listed (BoCCI)	Peatland habitats and wet grassland in Counties Tipperary, Offaly and Kildare		Habitat loss and fragmentation: Short-term, Moderate negative effects Habitat degradation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Moderate negative effects	Yes
Woodcock	Red Listed (BoCCI)	Drehid, Timahoe East and Derrycreeb, County Kildare Incha Beg, County Tipperary		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Slight negative effects	No
Yellowhammer	Red Listed (BoCCI)	Throughout the Proposed Project, strongly associated with tillage habitats to the east		Habitat loss and fragmentation: Short-term, Moderate negative effects Habitat degradation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Moderate negative effects	Yes

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Effect	Potential Significant Effect
Other Species of Low Conservation Significance (as listed in Table 8.44) (Medium to Very Low)	Red, Amber and Green Listed (BoCCI)	Throughout the Proposed Project in various habitats	Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons. Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance. The construction of the Proposed Project could potentially have a negative impact, resulting in a reduction in water quality which could have an indirect impact on water birds. Potential impacts include pollution from the build-up of silt, oil and/or chemical spillage as a result of construction activities in or near watercourses. Furthermore, there is potential for a 'breakout' of bentonite drilling fluid during trenchless water crossings and increases to sediment load as a result of open-cut crossing techniques.	Habitat loss and fragmentation: Short-term, Slight to Imperceptible negative effects Habitat degradation: Short-term, Slight to Imperceptible negative effects Disturbance/displacement: Short-term, Slight to Imperceptible negative effects	No
38 kV Uprate Works					
Black-headed gull	Amber Listed (BoCCI)	Various locations along the route of the 38 kV Uprate Works, including O'Briensbridge Parteen Basin and along the Headrace County Clare and County Tipperary	Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons. Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance.	Habitat loss and fragmentation: Short-term, Slight negative effect Disturbance/displacement: Short-term, Significant negative effects	Yes
Common gull	Amber Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Slight negative effects	No
Coot	Amber Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Slight negative effects	No
Cormorant	Amber Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Slight negative effect Disturbance/displacement: Short-term, Significant negative effects	Yes

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Effect	Potential Significant Effect
Curlew	Red Listed (BoCCI)	Various locations along the route of the 38 kV Uprate Works, including O'Briensbridge Parteen Basin and along the Headrace County Clare and County Tipperary	Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons. Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance.	Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Slight negative effects	No
Grey wagtail	Red Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Slight negative effects	No
Herring Gull	Amber Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Slight negative effects	No
Kestrel	Red Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Slight negative effects	No
Kingfisher	Amber Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Moderate negative effects	Yes
Lapwing	Red Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Slight negative effects	No
Lesser black-backed gull	Amber Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Slight negative effects	No
Mallard	Amber Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Not Significant negative effects	No

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Effect	Potential Significant Effect
Meadow pipit	Red Listed (BoCCI)	Various locations along the route of the 38 kV Uprate Works, including O'Briensbridge Parteen Basin and along the Headrace County Clare and County Tipperary	Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons. Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance.	Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Slight negative effects	No
Mute swan	Amber Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Not Significant negative effects	No
Redshank	Red Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Slight negative effects	No
Snipe	Red Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Moderate negative effects	Yes
Other Species of Low Conservation Significance (as listed in Table 8.44) (Medium to Very Low)	Red, Amber and Green Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Slight to Imperceptible negative effects Disturbance/displacement: Short-term, Slight to Imperceptible negative effects	No

8.5.5 Ornithology – Wintering Birds

8.5.5.1 Key Species of Conservation Significance

763. This section describes and assesses the potential for the Proposed Project to result in likely significant effects on wintering birds in the absence of mitigation. Potential impacts on wintering avian communities during the Construction Phase, within the study area of the Proposed Project, have been divided into three main types: habitat loss and fragmentation (Section 8.5.5.1.1), habitat degradation as a result of reduced quality of foraging habitat (Section 8.5.5.1.2), and disturbance/displacement (Section 8.5.5.1.3). Details on the construction of the Proposed Project can be found in Chapter 5 (Construction & Commissioning).

8.5.5.1.1 *Habitat Loss and Fragmentation*

764. The route of the Proposed Project and the sites for the RWI&PS, WTP, BPT, BPS, FCV and TPR were carefully selected to minimise the potential for direct and indirect impacts on habitats of local importance (higher value) or greater. However, the construction of the Proposed Project would result in temporary and permanent habitat loss which would consequently reduce the availability of local habitat for birds. The construction impacts associated with the Proposed Project are expected to last for the duration of the Construction Phase, which is estimated to be five years. Construction of the pipeline would be conducted in manageable lengths; portions of the pipeline route would be 'opened up' to create a new construction area once works in the previous construction area are suitably progressed/hearing completion. This would minimise the duration that an area is exposed to construction works. It is therefore reasonable to conclude that a section of land exposed to construction activity (associated with pipeline installation) would be reinstated within 24 months. After each section of the pipeline is installed, the land would be generally restored to pre-existing ground conditions with the exception of the 20m wide Permanent Wayleave, where post construction, landowners would not be permitted to plant larger species of trees such as poplar or willow within the wayleave due to the potential impact from their roots on the pipeline. The planting of some smaller trees, shrubs or hedges, are permitted, so long as they do not exceed 4m in height. The appraisal method guidelines for assessing potential impacts (Section 8.2.7) suggest quantifying the duration of a given impact based on ecological characteristics, such as a species' lifecycle. Therefore, the duration of habitat loss/fragmentation along the Proposed Project is expected to be short-term and last approximately one to two winter seasons.

765. With regard to the proposed 38 kV Uprate Works, for the access tracks, the worst-case scenario is that temporary habitat clearance would be required along a 3m-wide corridor to each existing poleset. The majority of habitats within the access track area are improved agricultural grassland, with the most sensitive habitats including: watercourses, hedgerows, and treelines at crossing points, and rank grassland and scrub. During the identification process of possible access tracks, existing tracks such as farm entrances were selected where practicable, thus reducing the amount of vegetation clearance required for the proposed 38 kV Uprate Works. The public road network would be used for the delivery of materials, plant and equipment from off-site compounds to the development corridor and individual towers. A section of the line that joins the southern line (Ardnacrusha – Birdhill – Nenagh Line; east of the R494) in a northerly direction to the Birdhill 38 kV Substation would be undergrounded. The trench for this line would occur along the existing roadway, minimising the loss of habitat for bird species.

766. Table 8.72 assesses the potential effects of habitat loss and fragmentation on the key wintering avian ecological receptor species as a result of the Proposed Project (excluding the 38 kV Uprate Works), while Table 8.73 assesses the potential effects of habitat loss and fragmentation on the KER avian ecological receptor species (i.e. species which were recorded frequently, in potentially significant numbers, and/or are considered to be of high conservation concern) as a result of the proposed 38 kV Uprate Works. The methodology of the assessment of the impact of habitat loss and fragmentation follows (Percival 2003) and (EPA 2022), as discussed in Section 8.2.7.

Table 8.72: Assessing the Potential Pre-Mitigation Effects of Habitat Loss and Fragmentation During the Construction Phase on Wintering Bird Key Ecological Receptors as a Result of the Proposed Project (excluding the 38 kV Uprate Works)

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Black-headed gull (High)	The majority of habitats within the Proposed Project are sub-optimal for foraging habitat for black-headed gull. This species was primarily recorded foraging on Lough Derg, Parteen Basin and Lough Ourna. This species was recorded frequently at these three sites during the winter bird season between 2015 and 2025. Given the short-term nature of the construction works, the unsuitability of the majority of habitats within the Proposed Project for this species, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Coot (High)	Various habitats in and surrounding Parteen Basin (where the proposed RWI&PS site is located) are used by wintering coot. This species was regularly recorded at Parteen Basin during the winter bird surveys between 2015 and 2025. This species was most often recorded in fringing habitat on the western shore. The magnitude of habitat loss is considered to be low if habitat loss is 1-5%, and negligible if less than 1%. The total area of Parteen Basin is 3.4km ² , therefore 1% is equal to 0.034km ² . The total area of the RWI (aquatic habitat) is 0.0056km ² . Therefore habitat loss is calculated to be less than 1%. Given the proportionately small area within Parteen Basin proposed for the development infrastructure (<1% habitat loss), and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Short-term, Not Significant effects
Cormorant (Very High)	Various habitats in and surrounding Parteen Basin (where the proposed RWI&PS site is located) are used by wintering cormorant. This species was consistently recorded at Parteen Basin during the winter months between 2015 and 2025. This species was most often recorded in fringing habitat on the western shore and roosting on the islands within the lake. The magnitude of habitat loss is considered to be low if habitat loss is 1-5%, and negligible if less than 1%. The total area of Parteen Basin is 3.4km ² , therefore 1% is equal to 0.034km ² . The total area of the RWI (aquatic habitat) is 0.0056km ² . Therefore habitat loss is calculated to be less than 1%. Given the proportionately small area within Parteen Basin proposed for the development infrastructure (<1% habitat loss), and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Very High Magnitude: Negligible Significance: Slight Short-term, Slight negative effects
Curlew (High)	Habitats which would fall within the Proposed Project are considered sub-optimal wintering and foraging habitat for curlew. Based on a consistent survey effort from 2015 to 2025 this species was recorded infrequently in low numbers within the Proposed Project during the wintering bird surveys, flocks never exceeded national or international population thresholds. Given the short-term nature of the construction works, the sub-optimal nature of the habitats within the Proposed Project and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Gadwall (Low)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide no suitable wintering habitat for gadwall. This species was recorded infrequently and often on or near large water bodies such as Lough Ourna. Numbers never exceeded national or international population thresholds. Given the short-term nature of the construction works, the unsuitability of the majority of habitats within the Proposed Project for this species, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Golden plover (Medium)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide little suitable wintering habitat for golden plover. Based on a consistent survey effort from 2015 to 2025 this species was recorded infrequently within the Proposed Project during the wintering bird surveys, flocks never exceeded national or international population thresholds. Given the short-term nature of the construction works, the sub-optimal nature of the habitats within the Proposed Project and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Goldeneye (Very High)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide no suitable wintering habitat for goldeneye. This species was recorded infrequently and often on or near large water bodies such as Parteen Basin and Lough Ourna. Numbers never exceeded national or international population thresholds. This species was most often recorded on open water in the centre of Parteen Basin reservoir and in fringing habitat on the western shore. The magnitude of habitat loss is considered to be low if habitat loss is 1-5%, and negligible if less than 1%. The total area of Parteen Basin is 3.4km ² , therefore 1% is equal to 0.034km ² . The total area of the RWI (aquatic habitat) is 0.0056km ² . Therefore, habitat loss is calculated to be less than 1%. Given the proportionately small area within Parteen Basin proposed for the development infrastructure (<1% habitat loss), and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Very High Magnitude: Negligible Significance: Slight Short-term, Slight negative effects
Great crested grebe (High)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide no suitable wintering habitat for great crested grebe. This species was primarily recorded foraging on Parteen Basin and Lough Ourna. The species was recorded wintering at Lough Ourna from 2015 to 2025, these wintering records are greater than 1.5km from the Proposed Project. Given the short-term nature of the construction works, the unsuitability of the majority of habitats within the Proposed Project for this species, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Hen harrier (High)	No hen harrier roost sites were recorded within the Proposed Project; therefore, no direct loss of roosting habitat would result from construction works. This species was recorded in low numbers during the wintering bird surveys carried out between 2015 and 2025. Given the short-term duration of the Construction Phase, the wide ranging nature of this species, and the availability of similar suitable habitats in the wider surroundings, the magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Herring gull (Low)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide little suitable wintering habitat for herring gull. The species was recorded infrequently and often on or near large water bodies such as Parteen Basin or near the built up areas surrounding the TPR. Records relate entirely to flying individuals or small flocks which generally passed through the study area. Numbers never exceeded national or international population thresholds. Given the short-term duration of the Construction Phase, the wide ranging nature of this species, and the availability of similar suitable habitats in the wider surroundings, the magnitude of the impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant effects
Lapwing (Medium)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide little suitable wintering habitat for lapwing. Based on a consistent survey effort from 2015 to 2025 this species was recorded frequently within the Proposed Project during the wintering bird surveys, typically on or near wet grasslands or bogs in Offaly and Kildare and thinly distributed elsewhere. Flocks never exceeded national or international population thresholds. This species is considered to be dependent on these peatland habitats surrounding the Proposed Project for wintering. The construction of the Proposed Project would result in a land-take which would consequently reduce the availability of local habitat for wintering lapwing. Given the Construction Phase would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Lesser black-backed gull (Low)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide little suitable wintering habitat for lesser black-backed gull. The species was recorded infrequently and often on or near large water bodies such as Parteen Basin or near the built up areas surrounding the TPR. Records relate entirely to flying individuals or small flocks which generally passed through the study area. Numbers never exceeded national or international population thresholds. Given the short-term duration of the Construction Phase, the wide ranging nature of this species, and the availability of similar suitable habitats in the wider surroundings, the magnitude of the impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant effects
Mallard (Low)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide no suitable wintering habitat for mallard. This species was recorded infrequently and often on or near large water bodies such as Parteen Basin and Lough Ourna or wetland habitats in Offaly and Kildare. Numbers never exceeded national or international population thresholds. Given the short-term nature of the construction works, the unsuitability of the majority of habitats within the Proposed Project for this species, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant effects
Mute swan (Very high)	Various habitats in and surrounding Parteen Basin (where the proposed RWI&PS site is located) are used by wintering mute swan. This species was consistently recorded at Parteen Basin during the wintering bird season between 2015 and 2025. This species was most often recorded in fringing habitat on the western shore. The magnitude of habitat loss is considered to be low if habitat loss is 1-5%, and negligible if less than 1%. The total area of Parteen Basin is 3.4km ² , therefore 1% is equal to 0.034km ² . The total area of the RWI (aquatic habitat) is 0.0056km ² . Therefore, habitat loss is calculated to be less than 1%. Given the proportionately small area within Parteen Basin proposed for the development infrastructure (<1% habitat loss), and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Very high Magnitude: Negligible Significance: Slight Short-term, Slight negative effects
Pochard (Medium)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide no suitable wintering habitat for pochard. This species was recorded infrequently and often on or near large water bodies such as Parteen Basin and Lough Ourna. Numbers never exceeded national or international population thresholds. Given the short-term nature of the construction works, the unsuitability of the majority of habitats within the Proposed Project for this species, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Redshank (Medium)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide little suitable wintering habitat for redshank. Based on a consistent survey effort from 2015 to 2025 this species was recorded frequently within the Proposed Project during the wintering bird surveys, typically near large water bodies such as Parteen Basin. Numbers never exceeded national or international population thresholds. Given the short-term nature of the construction works, the unsuitability of the majority of habitats within the Proposed Project for this species, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Shoveler (Medium)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide no suitable wintering habitat for shoveler. This species was recorded infrequently and often on or near large water bodies such as Lough Ourna. Numbers never exceeded national or international population thresholds. Given the short-term nature of the construction works, the unsuitability of the majority of habitats within the Proposed Project for this species, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Snipe (Medium)	The construction of the Proposed Project would result in a short-term loss of Snipe wintering habitat locally. Based on a consistent survey effort from 2015 to 2025, the most noteworthy observations of snipe were made during the wintering season. The majority of these wintering snipe records were confined to a large bog complex surrounding the Proposed Project in Counties Offaly and Kildare (Appendix A8.22: Winter Bird Surveys Summary Report). The construction of the Proposed Project would result in a land-take which would consequently reduce the availability of local habitat for wintering snipe. Given the Construction Phase would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects
Teal (Low)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide no suitable wintering habitat for teal. This species was recorded infrequently and often on or near large water bodies such as Parteen Basin. Numbers never exceeded national or international population thresholds. Given the short-term nature of the construction works, the unsuitability of the majority of habitats within the Proposed Project for this species, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant effects
Tufted duck (Very High)	Various habitats in and surrounding Parteen Basin (where the proposed RWI&PS site is located) are used by a significant population of wintering tufted duck. This species was consistently recorded at Parteen Basin during the winter months between 2015 and 2025. This species was most often recorded on open water in the centre of Parteen Basin reservoir and in fringing habitat on the western shore. The magnitude of habitat loss is considered to be low if habitat loss is 1-5%, and negligible if less than 1%. The total area of Parteen Basin is 3.4km ² , therefore 1% is equal to 0.034km ² . The total area of the RWI (aquatic habitat) is 0.0056km ² . Therefore, habitat loss is calculated to be less than 1%. Given the proportionately small area within Parteen Basin proposed for the development infrastructure (<1% habitat loss), and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Very High Magnitude: Negligible Significance: Slight Short-term, Slight negative effects
Whooper swan (Medium)	Various habitats in and surrounding Parteen Basin (where the proposed RWI&PS site is located) are used by wintering whooper swan. This species was consistently recorded at Parteen Basin during the winter months between 2015 and 2025. This species was most often recorded in fringing habitat on the western shore. Along the Proposed Project, this species was recorded outside the Proposed Project. The majority of habitats within the Proposed Project are sub-optimal for whooper swan for foraging. The magnitude of habitat loss is considered to be low if habitat loss is 1-5%, and negligible if less than 1%. The total area of Parteen Basin is 3.4km ² , therefore 1% is equal to 0.034km ² . The total area of the RWI (aquatic habitat) is 0.0056km ² . Therefore habitat loss is calculated to be less than 1%. Given the proportionately small area within Parteen Basin proposed for the development infrastructure (<1% habitat loss), and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible effects
Wigeon (Low)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide no suitable wintering habitat for wigeon. This species was recorded infrequently and often on or near large water bodies such as Parteen Basin and Lough Ourna or wetland habitats in Offaly and Kildare. Numbers never exceeded national or international population thresholds. Given the short-term nature of the construction works, the unsuitability of the majority of habitats within the Proposed Project for this species, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Other Species of Low Conservation Significance (as listed in Table 8.48 and Table 8.50) (Medium to Very Low)	These species were determined to be less at risk from potential impacts associated with the Proposed Project, as they have a more favourable conservation status, were rarely recorded during surveys, or are not thought to be dependent on the area for wintering or feeding. The majority of habitats within the Proposed Project are sub-optimal for foraging and provide little suitable wintering habitat for these species. Given the short-term duration of the Construction Phase, the wide-ranging nature of some of these species, and the availability of similar suitable habitats in the wider surroundings, the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Medium to Very Low Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible effects

Note: * Percival Significance Evaluation is calculated as a product of the sensitivity (Table 8.19) of the species and the magnitude (Table 8.20) of the effect.

Table 8.73: Assessing the Potential Pre-Mitigation Effects of Habitat Loss and Fragmentation During the Construction Phase on Wintering Bird Key Ecological Receptors as a Result of the 38 kV Uprate Works

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Cormorant (Very high)	This species was consistently recorded at Parteen Basin and the Lower River Shannon between the 2019/2020 and 2024/2025 wintering seasons. This species was most often recorded commuting along the Lower River Shannon as it flew between Parteen Basin and the River Fergus/Shannon Estuary and foraging on the Lower River Shannon. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Very high Magnitude: Negligible Significance: Slight Short-term, Slight negative effects
Common sandpiper (Low)	Common sandpiper was observed infrequently as it foraged along the shoreline of the Headrace. It was also once recorded foraging along the Lower River Shannon. Given the short-term nature of the construction works, the temporary nature of the access tracks, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant negative effects
Curlew (High)	Curlew was observed infrequently at Parteen Basin as it foraged along the shoreline. It was not recorded flying near the existing OHLs during the survey period. The Construction Phase would occur during the wintering season; however, it would be short-term in duration. This species is expected to use these habitats post construction. The magnitude of the impact is assessed to be of negligible concern.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Short-term, Not Significant negative effects
Green sandpiper (Low)	Green sandpiper was observed infrequently as it foraged along the shoreline of the Headrace. It was also once recorded foraging along the Lower River Shannon. Given the short-term nature of the construction works, the temporary nature of the access tracks, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant negative effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Great crested grebe (High)	This species was recorded infrequently and only at Parteen Basin. It was not recorded flying near any of the OHLs. This species spends most of its time on open unvegetated waters. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Short-term, Not Significant negative effects
Greylag goose (High)	This species was recorded frequently throughout the study area with commuting flights along the Lower River Shannon, Headrace and to Parteen Basin. The species was often recorded roosting on a spit of land on Parteen Basin on arrival during dawn surveys between 2019 to 2021. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), there is limited potential for ecologically significant habitat loss and fragmentation on this species, therefore, the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Short-term, Not Significant negative effects
Goldeneye (Very high)	This species was recorded infrequently and only at Parteen Basin. It was not recorded flying near any of the OHLs. This species spends most of its time on open unvegetated waters. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Very high Magnitude: Negligible Significance: Slight Short-term, Slight negative effects
Goosander (High)	This species was only recorded one at Parteen Basin in 2021. It was not recorded flying near any of the OHLs. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Short-term, Not Significant negative effects
Lapwing (Medium)	Lapwing were recorded on a number of occasions throughout the winter surveys on the Headrace, Parteen Basin and on the Lower River Shannon. The Construction Phase would occur during the wintering season; however, it would be short-term in duration. This species is expected to use these habitats post construction. The magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Little grebe (High)	Little grebe was encountered infrequently as they foraged on Parteen Basin, the Headrace and the Lower River Shannon. Although this species is considered at high risk of collision with OHLs, it was not recorded flying at collision height or in the ZoI of the existing lines. This species spends most of its time near the shoreline, particularly among reedbeds. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Short-term, Not Significant negative effects
Mallard (Low)	This species was recorded frequently throughout the study area with commuting flights along the Lower River Shannon, Headrace, open countryside and Parteen Basin. This species regularly commuted in the ZoI of the existing OHLs. Given the short-term nature of the construction works, the temporary nature of the access tracks, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant negative effects
Moorhen (Very low)	Moorhen was encountered infrequently as they foraged on Parteen Basin, the Headrace and the Lower River Shannon. Although this species is considered at high risk of collision with OHLs, it was not recorded flying at collision height or in the ZoI of the existing lines. This species spends most of its time near the shoreline, particularly among reedbeds. Given the short-term nature of the construction works, the temporary nature of the access tracks, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Very Low Magnitude: Low Significance: Imperceptible Short-term, Imperceptible negative effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Mute swan (Very high)	Mute swan is widespread using shallower areas close to the reedbeds shoreline and islands rather than the more open sections of water. They were recorded frequently throughout the study area with commuting flights along the Lower River Shannon, Headrace and Parteen Basin. This species was recorded flying at collision height on one occasion in 2019 as it commuted along the Lower River Shannon. Given the short-term nature of the Construction Phase, the temporary nature of the access tracks, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Very high Magnitude: Negligible Significance: Slight Short-term, Slight negative effects
Pochard (Medium)	This species was recorded infrequently and only at Parteen Basin. It was not recorded flying near any of the OHLs. This species spends most of its time on open unvegetated waters. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Redshank (Medium)	Redshank was observed frequently as it foraged along the shoreline of the Headrace. It was not observed flying in the ZoI of the OHLs. Given the short-term nature of the Construction Phase, the temporary nature of the access tracks, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects.
Snipe (Medium)	The construction of the proposed 38 kV Uprate Works would result in a short-term loss of snipe breeding and foraging habitat locally. This species was recorded on two occasions during summer months in 2019. Given the short-term nature of the construction works, the temporary nature of the access tracks, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Scaup (Medium)	This species was recorded infrequently and only at Parteen Basin. It was not recorded flying near any of the OHLs. This species spends most of its time on open unvegetated waters. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Teal (Low)	This species was recorded infrequently and only at Parteen Basin. It was not recorded flying near any of the OHLs. This species spends most of its time on open unvegetated waters. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Tufted duck (Very high)	Tufted duck were present on Parteen Basin and concentrate near the shoreline in shallower waters on the edges of reed-beds. Tufted duck populations exceeded the 1% national threshold (270) at Parteen Basin in January, November, and December 2020, and January 2021 when they reached 400, 900, 365 and 310 individuals respectively. They were infrequently recorded flying and not observed near any existing OHLs. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Very high Magnitude: Negligible Significance: Slight Short-term, Slight negative effects
Wigeon (Low)	This species was recorded infrequently and only at Parteen Basin. It was not recorded flying near any of the OHLs. This species spends most of its time on open unvegetated waters. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Whooper swan (Medium)	Whooper swan were recorded on Parteen Basin and the open countryside infrequently and in low numbers. They are considered a high-risk species in terms of collision with OHLs, they were recorded flying above the existing OHLs from a VP overlooking the open countryside. Given the short-term nature of the construction works, the temporary nature of the access tracks, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Other Species of Low Conservation Significance (as listed in Section 8.3.5.2.3) (Medium to Very Low)	These species were determined to be less at risk from potential impacts associated with the Proposed Project, as they have a more favourable conservation status, were rarely recorded during surveys, or are not thought to be dependent on the area for wintering or feeding. The majority of habitats within the Proposed Project are sub-optimal for foraging and provide little suitable wintering habitat for these species. Given the short-term duration of the Construction Phase, the wide-ranging nature of some of these species, and the availability of similar suitable habitats in the wider surroundings, the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Medium to Very Low Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible effects

Note: *Percival Significance Evaluation is calculated as a product of the sensitivity (Table 8.19) of the species and the magnitude (Table 8.20) of the effect

8.5.5.1.2 *Habitat Degradation as a Result of Reduced Quality of Foraging Habitat*

767. Similarly to other major infrastructure projects which include works within or across water bodies, the Construction Phase could potentially have a negative impact on water quality in the absence of control measures or mitigation. A wide range of environmental factors are required to support water bird species, including good water quality and clarity, good supply of food resources, and suitable breeding sites. Thus, a reduction of water quality during the Construction Phase could result in a reduction in the availability of suitable habitat for water bird species. Without appropriate mitigation measures in place, a reduction in water quality could potentially have significant ecological effects. These effects would vary with species, habitat choice, life-cycle, breeding status, range, and with the duration of construction activities. The potential effects associated with a possible reduction in water quality due to construction activities are only likely to occur during the Construction Phase. These effects are therefore considered to be short-term in duration.
768. Potential impacts on water quality as a result of the construction of the Proposed Project include:
- Increased sediment load
 - Oil effects on bankside habitat, amenity and surface features followed by pollution of the water column as oil degrades
 - Pollution of the water column from chemical discharge.
769. These impacts may occur as results of:
- Damming and working in the watercourses
 - Silt-laden runoff from construction works
 - Accidental spillage of oil and/or chemicals
 - In cases where a watercourse would be crossed using trenchless excavation, a potential for a 'breakout' of bentonite drilling fluid (a fine suspended solids) (Chapter 9: Water).
770. As is described in Chapter 5 (Construction & Commissioning), there are two approaches to watercourse crossings; trenchless or open-cut, with potential effects associated with both techniques:
- In the case of trenchless crossings, there is potential for a 'breakout' of bentonite drilling fluid, in effect, a slurry of very fine suspended solids. If a pathway exists, and in the absence of control measures or mitigation, this slurry could enter a watercourse and result in an increased sediment load. In practice there is very low probability of this occurring
 - In the case of open-cut crossings, there are two approaches identified: fluming and over-pumping. Both techniques require the watercourses to be dammed. This could result in the build-up of silt behind the damming structure; during reinstatement, this silt could be released and result in a sudden increase in sediment load to the downstream river.
771. Spillages, into either the dammed or dry riverbed areas, of miscible (capable of being mixed in water in this case) substances (e.g. pesticides), immiscible substances (e.g. oil), and concrete and other cements, in the absence of mitigation, have the potential to impact water quality even in small quantities. Further details on the potential impacts on surface water quality are addressed in Chapter 9 (Water).
772. Table 8.74 assesses the potential effect of a reduction in water quality on KER avian ecological receptor species observed within the Proposed Project. The methodology of the assessment of the impact of a reduction in water quality follows Percival (2003) and EPA (2022), as discussed in Section 8.2.7.

Table 8.74: Assessing the Potential Pre-Mitigation Effects of Habitat Degradation During the Construction Phase on Wintering Key Ecological Receptors as a Result of the Proposed Project

Key Ecological Receptor (Sensitivity)	Survey Results	Pollutants (Magnitude)	Significance Evaluation*
Black-headed gull (High)	Black-headed gull were regularly recorded on or near large water bodies such as Parteen Basin and Lough Ourna. Observations mostly related to flying or resting individuals. Numbers never exceeded national or international population thresholds.	Indirect impacts on water birds may occur as a result of increased sediment load and/or accidental spillage of oil and/or chemicals to receiving watercourses and water bodies within the Proposed Project during the Construction Phase (see Section 8.5.4.1). This could have an indirect short-term impact on water birds as it is likely to reduce the quality of their foraging habitat (i.e. indirectly affect water birds through a loss of available food resources (aquatic prey)). An extreme pollution event (e.g. large oil or chemical spill) could cause mortality of water birds in the immediate environs or have a negative effect on their health. In the absence of best practice design and mitigation, there is a probable chance of increased sediment load and/or accidental spillage impacts occurring. The magnitude of such events would impact KER species differently depending on ecology and life cycles; therefore, the magnitude of the impact is assessed to range from negligible to medium concern.	Sensitivity: High Magnitude: Medium Significance: Significant Short-term, Significant negative effects
Coot (High)	Coot were regularly record on or near the large water bodies along the Proposed Project. Observations typically related to loafing or feeding individuals. During I-WeBS surveys (particularly at Parteen Basin) numbers observed were high, even exceeding the 1% national threshold (i.e. greater than 20) during the 2015/2016 winter season, but significantly declined in the following years, where no coots were observed from 2019 to 2021.		Sensitivity: High Magnitude: Medium Significance: Significant Short-term, Significant negative effects
Cormorant (Very High)	Cormorant were regularly recorded on or near large water bodies such as Parteen Basin and Lough Ourna. Observations mostly related to flying or resting individuals. Numbers never exceeded national or international population thresholds.		Sensitivity: Very High Magnitude: Medium Significance: Significant Short-term, Significant negative effects
Curlew (High)	Curlew were occasionally recorded along the Proposed Project, often in small flocks which were observed feeding or resting typically on or near wet grasslands or bogs. Flocks never exceeded national or international population thresholds. The species was not typically found near watercourse or water bodies and is not likely to be dependent on potentially impacted habitats.		Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Gadwall (Low)	Gadwall were recorded infrequently and often on or near large water bodies such as Lough Ourna. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.		Sensitivity: Low Magnitude: Medium Significance: Slight Short-term, Slight negative effects
Golden plover (Medium)	Golden plover were recorded infrequently and often on or near wetlands and bogs along the Proposed Project. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds. The species was not typically found near watercourse or water bodies and is not likely to be dependent on potentially impacted habitats.		Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Goldeneye (Very High)	Goldeneye were recorded infrequently and often on or near large water bodies such as Parteen Basin and Lough Ourna. Records related to feeding or resting individuals or small flocks. Numbers never exceeded national or international population thresholds.		Sensitivity: Very High Magnitude: Medium Significance: Significant Short-term, Significant negative effects

Key Ecological Receptor (Sensitivity)	Survey Results	Pollutants (Magnitude)	Significance Evaluation*
Great crested grebe (High)	Great crested grebe were recorded infrequently and often on or near large water bodies such as Parteen Basin and Lough Ourna. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.	Indirect impacts on water birds may occur as a result of increased sediment load and/or accidental spillage of oil and/or chemicals to receiving watercourses and water bodies within the Proposed Project during the Construction Phase (see Section 8.5.4.1). This could have an indirect short-term impact on water birds as it is likely to reduce the quality of their foraging habitat (i.e. indirectly affect water birds through a loss of available food resources (aquatic prey)). An extreme pollution event (e.g. large oil or chemical spill) could cause mortality of water birds in the immediate environs or have a negative effect on their health. In the absence of best practice design and mitigation, there is a probable chance of increased sediment load and/or accidental spillage impacts occurring. The magnitude of such events would impact KER species differently depending on ecology and life cycles; therefore, the magnitude of the impact is assessed to range from negligible to medium concern.	Sensitivity: High Magnitude: Medium Significance: Significant Short-term, Significant negative effects
Hen harrier (High)	Hen harrier was recorded infrequently on or near large bog complexes or rough grassland in Counties Tipperary, Offaly and Kildare. Records related to commuting individuals. No definitive hen harrier roosts were identified during the survey seasons from the winter of 2016/2017 up to 2020/2021, from any of the survey locations located along the route of the Treated Water Pipeline. Male hen harriers was recorded on two occasions in 2016 potentially visiting roosting areas, near suitable roosting habitat, however repeat visits to this site in 2016 and subsequent years did not result in further observations of the species using these sites for roosting. The species was not typically found near watercourses or water bodies and is not likely to be dependent on potentially impacted habitats.		Sensitivity: High Magnitude: Negligible Significance: Not Significant Short-term, Not Significant negative effects
Herring gull (Low)	Herring gull were recorded infrequently and often on or near large water bodies such as Parteen Basin or near the built-up areas surrounding the TPR. Records relate entirely to flying individuals or small flocks which generally passed through the study area. Numbers never exceeded national or international population thresholds.		Sensitivity: Low Magnitude: Medium Significance: Slight Short-term, Slight negative effects
Lapwing (Medium)	Lapwing were frequently recorded along the Proposed Project, often in flocks which were observed feeding or resting, typically on or near wet grasslands or bogs in Offaly and Kildare and thinly distributed elsewhere. Flocks never exceeded national or international population thresholds. The species was not typically found near watercourses or water bodies and is not likely to be dependent on potentially impacted habitats.		Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Lesser black-backed gull (Low)	Lesser black-backed gull were occasionally recorded along the Proposed Project. Records relate entirely to flying individuals or small flocks which generally passed through the study area. Numbers never exceeded national or international population thresholds.		Sensitivity: Low Magnitude: Medium Significance: Slight Short-term, Slight negative effects
Mallard (Low)	Mallard were recorded infrequently and often on or near large water bodies or wetlands along the Proposed Project. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.		Sensitivity: Low Magnitude: Medium Significance: Slight Short-term, Slight negative effects
Mute swan (Very high)	Mute swan were regularly recorded on or near the large water bodies or wetlands along the Proposed Project. Observations typically related to loafing or feeding individuals. Numbers never exceeded national or international population thresholds. During VP surveys at Parteen Basin, mute swan was only found commuting between Lough Derg and Parteen Basin on 13 occasions over the survey period, with the populations in each appearing resident in each water body.		Sensitivity: Very high Magnitude: Medium Significance: Significant Short-term, Significant negative effects

Key Ecological Receptor (Sensitivity)	Survey Results	Pollutants (Magnitude)	Significance Evaluation*
Pochard (Medium)	Pochard were recorded infrequently and often on or near large water bodies such as Parteen Basin and Lough Ourna. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.	Indirect impacts on water birds may occur as a result of increased sediment load and/or accidental spillage of oil and/or chemicals to receiving watercourses and water bodies within the Proposed Project during the Construction Phase (see Section 8.5.4.1). This could have an indirect short-term impact on water birds as it is likely to reduce the quality of their foraging habitat (i.e. indirectly affect water birds through a loss of available food resources (aquatic prey)). An extreme pollution event (e.g. large oil or chemical spill) could cause mortality of water birds in the immediate environs or have a negative effect on their health. In the absence of best practice design and mitigation, there is a probable chance of increased sediment load and/or accidental spillage impacts occurring. The magnitude of such events would impact KER species differently depending on ecology and life cycles; therefore, the magnitude of the impact is assessed to range from negligible to medium concern.	Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects
Redshank (Medium)	Redshank were recorded infrequently and often on or near large water bodies such as Parteen Basin. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds. The species was not typically found near watercourses or water bodies and is not likely to be dependent on potentially impacted habitats		Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Shoveler (Medium)	Shoveler were recorded infrequently and often on or near large water bodies such as Lough Ourna. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.		Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects
Snipe (Medium)	Snipe were recorded infrequently and often on or near wetland areas along the Proposed Project. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds. The species was not typically found near watercourses or water bodies and is not likely to be dependent on potentially impacted habitats.		Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Teal (Low)	Teal were recorded infrequently and often on or near large water bodies such as Parteen Basin. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.		Sensitivity: Low Magnitude: Medium Significance: Slight Short-term, Slight negative effects
Tufted duck (Very High)	Tufted duck were regularly recorded on or near the large water bodies such as Parteen Basin. Observations typically related to loafing or feeding individuals. Tufted duck exceeded nationally important numbers (i.e. greater than 270) during seven of the survey seasons (2015/2016, 2016/2017, 2017/2018, 2018/2019, 2019/2020, 2020/2021 and 2022/2023). Tufted duck often formed one large or several small flocks on Parteen Basin during the winter bird seasons. During VP surveys at Parteen Basin, a large number of flights were recorded, however the majority of these consisted of flights within Parteen Basin. Only six tufted duck were found to be commuting between Lough Derg and Parteen Basin over the survey period, with the populations in each appearing resident in each water body.		Sensitivity: Very High Magnitude: Medium Significance: Significant Short-term, Significant negative effects
Whooper swan (Medium)	Whooper swan were recorded infrequently on or near the large water bodies or wetlands along the Proposed Project. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.		Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects

Key Ecological Receptor (Sensitivity)	Survey Results	Pollutants (Magnitude)	Significance Evaluation*
Wigeon (Low)	Wigeon were recorded infrequently and often on or near large water bodies such as Parteen Basin and Lough Ourna. Records related to feeding or resting individuals. Numbers never exceeded national or international population thresholds.	Indirect impacts on water birds may occur as a result of increased sediment load and/or accidental spillage of oil and/or chemicals to receiving watercourses and water bodies within the Proposed Project during the Construction Phase (see Section 8.5.4.1). This could have an indirect short-term impact on water birds as it is likely to reduce the quality of their foraging habitat (i.e. indirectly affect water birds through a loss of available food resources (aquatic prey)). An extreme pollution event (e.g. large oil or chemical spill) could cause mortality of water birds in the immediate environs or have a negative effect on their health. In the absence of best practice design and mitigation, there is a probable chance of increased sediment load and/or accidental spillage impacts occurring. The magnitude of such events would impact KER species differently depending on ecology and life cycles; therefore, the magnitude of the impact is assessed to range from negligible to medium concern.	Sensitivity: Low Magnitude: Medium Significance: Slight Short-term, Slight negative effects
Other Species of Low Conservation Significance (as listed in Table 8.48 and Table 8.50) (Medium to Very Low)	These species were determined to be less at risk from potential impacts associated with the Proposed Project, as they have a more favourable conservation status, were rarely recorded during surveys, or are not thought to be dependent on the area for wintering or feeding. More details can be found in Table 8.48 and Table 8.50. No national or international population for any of these species were observed.		Sensitivity: Medium to Very Low Magnitude: Low Significance: Slight Short-term, Slight to imperceptible negative effects

Note: * Percival Significance Evaluation is calculated as a product of the sensitivity (Table 8.19) of the species and the magnitude (Table 8.20) of the effect.

8.5.5.1.3 *Disturbance/Displacement*

773. Effective habitat loss through species disturbance/displacement can occur as a result of construction activities such as movement of machinery and the associated noise and disturbance associated with the presence of construction staff. Disturbance/displacement to birds can have negative impacts to individuals or populations of bird species, including reduction in body condition due to lack of available feeding areas, increased energy expenditure by fleeing birds, or the reduction or predation of nests (Price 2008). Disturbance/displacement impacts can be further exacerbated in winter when bird species are more vulnerable to the cold weather and lack of feeding sources. Studies have investigated this observation; the magnitude of the effect has been found to vary with species, breeding status, and with the availability of alternative habitat nearby (Ruddock and Whitfield 2007). These studies have been conducted within various habitat types, including upland, coastal and offshore wind farm sites. Although the results of such studies have been shown to vary, it remains clear that under particular circumstances some displacement can occur. Without appropriate mitigation measures in place, construction activities have the potential to result in a likely significant effect.
774. Within the Proposed Project potential disturbance/displacement effects may occur during the Construction Phase. These effects would vary with species, habitat choice, breeding status, range and with the duration of the construction works. Potential disturbance/displacement effects would be felt for the duration of construction works only. As mentioned, the duration of the Construction Phase is estimated to be five years; however, the construction of the pipeline would be conducted in manageable lengths to ensure that disruption to individual landowners would be minimised and to minimise the duration that an area is exposed to construction works. It is therefore reasonable to conclude that a section of land exposed to construction activity (associated with pipeline installation) would be reinstated within 24 months; therefore, potential disturbance/displacement effects are expected to be short-term in duration.
775. Table 8.75 assesses the potential effects of disturbance/displacement on the key wintering avian ecological receptor species as a result of the Proposed Project (excluding the 38 kV Uprate Works), while Table 8.76 assesses the potential effect of disturbance/displacement on KER avian ecological receptor species as a result of the proposed 38 kV Uprate Works. The methodology of the assessment of the impact of habitat loss and fragmentation follows (Percival 2003) and (EPA 2022), as discussed in Section 8.2.7.

Table 8.75: Assessing the Potential Pre-Mitigation Effects of Disturbance/Displacement During the Construction Phase on Wintering Key Ecological Receptors as a Result of the Proposed Project (excluding the 38 kV Uprate Works)

Key Ecological Receptor (Sensitivity)	Disturbance/Displacement (Magnitude)	Significance Evaluation*
Black-headed gull (High)	Black-headed gull were regularly recorded on or near large water bodies such as Parteen Basin and Lough Ourna. Observations mostly related to flying or resting individuals. Numbers never exceeded national or international population thresholds. It is considered that the distance of the black-headed gull records from the Proposed Project and the short-term duration of construction works limits the potential for ecologically significant effects. The magnitude of the impact is assessed to be of low concern	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Coot (High)	Various habitats in and surrounding Parteen Basin (where the proposed RWI&PS site is located) are used by wintering coot. This species was regularly recorded at Parteen Basin during the wintering bird surveys between 2015 and 2025. This species was most often recorded in fringing habitat on the western shore. 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 on coot. Given the short-term duration of the construction works, the width of the Parteen Basin, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Cormorant (Very High)	Various habitats in and surrounding Parteen Basin (where the proposed RWI&PS site is located) are used by wintering cormorant. This species was consistently recorded at Parteen Basin during the winter months between 2015 and 2025. This species was most often recorded in fringing habitat on the western shore and roosting on the islands within the lake. 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 on cormorant. Given the short-term duration of the construction works, the width of the Parteen Basin, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Very High Magnitude: Low Significance: Moderate Short-term, Moderate negative effects
Curlew (High)	Habitats which would fall within the Proposed Project are considered sub-optimal wintering and foraging habitat for curlew. Based on a consistent survey effort from 2015 to 2025 this species was recorded infrequently in low numbers within the Proposed Project during the wintering bird surveys. Wintering curlew were occasionally recorded on fringing habitat surrounding the Proposed Project. Individuals displaced from fringing habitats as a result of disturbance effects associated with construction activities are expected to return following the completion of construction in the affected area. Therefore, the magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Gadwall (Low)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide no suitable wintering habitat for gadwall. This species was recorded infrequently and often on or near large water bodies such as Lough Ourna. Numbers never exceeded national or international population thresholds. It is considered that the distance of the gadwall records from the Proposed Project and the short-term duration of construction works limits the potential for ecologically significant effects. The magnitude of the impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant effects
Golden plover (Medium)	Habitats which would fall within the Proposed Project are considered sub-optimal wintering and foraging habitat for golden plover. Based on a consistent survey effort from 2015 to 2025 this species was recorded infrequently in low numbers within the Proposed Project during the wintering bird surveys. Wintering golden plover were occasionally recorded on fringing habitat surrounding the Proposed Project. Individuals displaced from fringing habitats as a result of disturbance effects associated with construction activities are expected to return following the completion of construction in the affected area. Therefore the magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects

Key Ecological Receptor (Sensitivity)	Disturbance/Displacement (Magnitude)	Significance Evaluation*
Goldeneye (Very High)	Various habitats in and surrounding Parteen Basin (where the proposed RWI&PS site is located) are used by wintering goldeneye. This species was regularly recorded at Parteen Basin during the winter months between 2015 and 2025. However numbers were well below national importance estimates. This species was most often recorded on open water in the centre of Parteen Basin reservoir and in fringing habitat on the western shore. In Ruddock and Whitfield (2007) displacement has been suggested to occur up to 250m from vehicular traffic. 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 on goldeneye. Given the short-term duration of the construction works, the width of the Parteen Basin, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Very High Magnitude: Low Significance: Moderate Short-term, Moderate negative effects
Great crested grebe (High)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide little suitable wintering habitat for great crested grebe. This species was primarily recorded foraging on Parteen Basin and Lough Ourna. Disturbance effects to great crested grebe have been recorded to occur up to 100m (Keller 1989), given the wintering records at Lough Ourna are greater than 1.5km from the Proposed Project, the short-term nature of the construction works, the unsuitability of the majority of habitats within the Proposed Project for this species, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Hen harrier (High)	According to Bright <i>et al.</i> (2006) displacement of hen harrier can occur up to 500m around a construction site. No roost sites were recorded for this species within 500m of the Proposed Project. This species was found to infrequently use the wider surroundings of the Proposed Project for roosting. Therefore, no direct loss of roosting habitat is expected as a result of disturbance/displacement effects. Given the short-term duration of the Construction Phase, the wide-ranging nature of this species, and the availability of similar suitable habitats in the surroundings, the magnitude of the impact is assessed to be of low concern.	Sensitivity: High Magnitude: Low Significance: Slight Short-term, Slight negative effects
Herring gull (Low)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide little suitable wintering habitat for herring gull. The species was recorded infrequently and often on or near large water bodies such as Parteen Basin or near the built-up areas surrounding the TPR. Records relate entirely to flying individuals or small flocks which generally passed through the study area. Numbers never exceeded national or international population thresholds. Given the short-term duration of the Construction Phase, the wide-ranging nature of this species, and the availability of similar suitable habitats in the wider surroundings, the magnitude of disturbance/displacement impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant effects
Lapwing (Medium)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide little suitable wintering habitat for lapwing. Based on a consistent survey effort from 2015 to 2025 this species was recorded frequently within the Proposed Project during the wintering bird surveys, typically on or near wet grasslands or bogs in Offaly and Kildare and thinly distributed elsewhere. Flocks never exceeded national or international population thresholds. This species is considered to be dependent on these peatland habitats surrounding the Proposed Project for wintering. The construction of the Proposed Project would result in a disturbance which would consequently reduce the availability of local habitat for wintering lapwing. Given the Construction Phase would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects
Lesser black-backed gull (Low)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide little suitable wintering habitat for lesser black-backed gull. The species was recorded infrequently and often on or near large water bodies such as Parteen Basin or near the built-up areas surrounding the TPR. Records relate entirely to flying individuals or small flocks which generally passed through the study area. Numbers never exceeded national or international population thresholds. Given the short-term duration of the Construction Phase, the wide-ranging nature of this species, and the availability of similar suitable habitats in the wider surroundings, the magnitude of disturbance/displacement impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant effects

Key Ecological Receptor (Sensitivity)	Disturbance/Displacement (Magnitude)	Significance Evaluation*
Mallard (Low)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide no suitable wintering habitat for mallard. This species was recorded infrequently and often on or near large water bodies such as Parteen Basin and Lough Ourna or wetland habitats in Offaly and Kildare. Numbers never exceeded national or international population thresholds. It is considered that the distance of the mallard records from the Proposed Project and the short-term duration of construction works limits the potential for ecologically significant effects. The magnitude of the impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant effects
Mute swan (Very high)	Various habitats in and surrounding Parteen Basin (where the proposed RWI&PS site is located) are used by wintering mute swan. This species was consistently recorded at Parteen Basin during the wintering bird season between 2015 and 2025, most often in fringing habitat on the western shore. 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 on mute swan. Given the short-term duration of the construction works, the width of the Parteen Basin, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Very high Magnitude: Low Significance: Moderate Short-term, Moderate negative effects
Pochard (Medium)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide no suitable wintering habitat for pochard. This species was recorded infrequently and often on or near large water bodies such as Parteen Basin and Lough Ourna. Numbers never exceeded national or international population thresholds. It is considered that the distance of the pochard records from the Proposed Project and the short-term duration of construction works limits the potential for ecologically significant effects. The magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Redshank (Medium)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide little suitable wintering habitat for redshank. Based on a consistent survey effort from 2015 to 2025 this species was recorded frequently within the Proposed Project during the wintering bird surveys, typically near large water bodies such as Parteen Basin. Numbers never exceeded national or international population thresholds. Given the short-term nature of the construction works, the unsuitability of the majority of habitats within the Proposed Project for this species, the magnitude of the disturbance impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Shoveler (Medium)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide no suitable wintering habitat for shoveler. This species was recorded infrequently and often on or near large water bodies such as Lough Ourna. Numbers never exceeded national or international population thresholds. It is considered that the distance of the shoveler records from the Proposed Project and the short-term duration of construction works limits the potential for ecologically significant effects. The magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Snipe (Medium)	Several wintering snipe territories were recorded within the Proposed Project. The majority of these wintering snipe were confined to a large bog complex which surrounds the Proposed Project in Counties Offaly and Kildare. This species is considered to be dependent on these peatland habitats surrounding the Proposed Project for wintering. Outside of this location, the number of wintering territories was found to be low. However, this species has a widespread distribution throughout the country. Given construction effects would be short-term in duration, the species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of medium concern.	Sensitivity: Medium Magnitude: Medium Significance: Moderate Short-term, Moderate negative effects
Teal (Low)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide no suitable wintering habitat for teal. This species was recorded infrequently and often on or near large water bodies such as Parteen Basin. Numbers never exceeded national or international population thresholds. It is considered that the distance of the teal records from the Proposed Project and the short-term duration of construction works limits the potential for ecologically significant effects. The magnitude of the impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant effects

Key Ecological Receptor (Sensitivity)	Disturbance/Displacement (Magnitude)	Significance Evaluation*
Tufted duck (Very High)	Various habitats in and surrounding Parteen Basin (where the proposed RWI&PS site is located) are used by a significant population of wintering tufted duck. This species was consistently recorded at Parteen Basin during the winter months between 2015 and 2025. This species was most often recorded on open water in the centre of Parteen Basin reservoir and in fringing habitat on the western shore. 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 on tufted duck. Given the short-term duration of the construction works, the width of the Parteen Basin, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Very High Magnitude: Low Significance: Moderate Short-term, Moderate negative effects
Whooper swan (Medium)	Various habitats in and surrounding Parteen Basin (where the proposed RWI&PS site is located) are used by wintering whooper swan. This species was consistently recorded at Parteen Basin during the winter months between 2015 and 2025, most often in fringing habitat on the western shore. Along the Proposed Project, this species was recorded outside the Proposed Project. The majority of habitats within the Proposed Project are sub-optimal for whooper swan for foraging. 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 on whooper swan. Given the short-term duration of the construction works, the width of the Parteen Basin, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of low concern.	Sensitivity: Medium Magnitude: Low Significance: Slight Short-term, Slight negative effects
Wigeon (Low)	The majority of habitats within the Proposed Project are sub-optimal for foraging and provide little suitable wintering habitat for wigeon. This species was recorded infrequently and often on or near large water bodies such as Parteen Basin and Lough Ourna or wetland habitats in Offaly and Kildare. Numbers never exceeded national or international population thresholds. It is considered that the distance of the wigeon records from the Proposed Project and the short-term duration of construction works limits the potential for ecologically significant effects. The magnitude of the impact is assessed to be of low concern.	Sensitivity: Low Magnitude: Low Significance: Not Significant Short-term, Not Significant effects
Other Species of Low Conservation Significance (as listed in Table 8.48 and Table 8.50) (Medium to Very Low)	These species were determined to be less at risk from potential impacts associated with the Proposed Project, as they have a more favourable conservation status, were rarely recorded during surveys, or are not thought to be dependent on the area for wintering or feeding. The majority of habitats within the Proposed Project are sub-optimal for foraging and provide little suitable wintering habitat for these species. Given the short-term duration of the Construction Phase, the wide-ranging nature of some of these species, and the availability of similar suitable habitats in the wider surroundings, the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Medium to Very Low Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects

Note: * Percival Significance Evaluation is calculated as a product of the sensitivity (Table 8.19) of the species and the magnitude (Table 8.20) of the effect.

Table 8.76: Assessing the Potential Pre-Mitigation Effects of Disturbance/Displacement During the Construction Phase on Wintering Bird Key Ecological Receptors as a Result of the 38 kV Uprate Works

Key Ecological Receptor (Collision Sensitivity [EirGrid 2020])	Disturbance/Displacement (Magnitude)	Significance Evaluation*
Cormorant (Very high)	This species was consistently recorded at Parteen Basin and the Lower River Shannon during the 2019/20 and 2020/21 wintering season. This species was most often recorded commuting along the Lower River Shannon as it flew between Parteen Basin and the River Fergus/Shannon Estuary and foraging on the Lower River Shannon. The foraging and commuting of this species would be disturbed as a result of the construction of the proposed 38 kV Uprate Works. However, given the majority of habitats within the proposed 38 kV Uprate Works are terrestrial habitats and provide little or no suitable wintering habitat and are sub-optimal for foraging for this species, and as the construction impacts would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Very high Magnitude: Negligible Significance: Slight Short-term, Slight negative effects
Common sandpiper (Low)	Common sandpiper was observed infrequently as it foraged along the shoreline of the Headrace. It was also once recorded foraging along the Lower River Shannon. The foraging and commuting of this species would be disturbed as a result of the construction of the proposed 38 kV Uprate Works. However, given the majority of habitats within the proposed 38 kV Uprate Works are terrestrial habitats and provide little or no suitable wintering habitat and are sub-optimal for foraging for this species, and as the construction impacts would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Curlew (High)	The foraging and commuting of this species would be disturbed as a result of the construction of the proposed 38 kV Uprate Works. However, given the majority of habitats within the proposed 38 kV Uprate Works are terrestrial habitats and provide little or no suitable wintering habitat and are sub-optimal for foraging for this species, and as the construction impacts would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Short-term, Not Significant negative effects
Green sandpiper (Low)	Green sandpiper was observed infrequently as it foraged along the shoreline of the Headrace. It was also once recorded foraging along the Lower River Shannon. The foraging and commuting of this species would be disturbed as a result of the construction of the proposed 38 kV Uprate Works. However, given the majority of habitats within the proposed 38 kV Uprate Works are terrestrial habitats and provide little or no suitable wintering habitat and are sub-optimal for foraging for this species, and as the construction impacts would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Great crested grebe (High)	This species was recorded infrequently and only at Parteen Basin. It was not recorded flying near any of the OHLs. This species spends most of its time on open unvegetated waters. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Short-term, Not Significant negative effects
Greylag goose (High)	This species was recorded frequently throughout the study area with commuting flights along the Lower River Shannon, Headrace and to Parteen Basin. The species was often recorded roosting on a spit of land on Parteen Basin on arrival during dawn surveys between 2019 to 2021. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), there is limited potential for ecologically significant habitat loss and fragmentation on this species, therefore, the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Short-term, Not Significant negative effects

Key Ecological Receptor (Collision Sensitivity [EirGrid 2020])	Disturbance/Displacement (Magnitude)	Significance Evaluation*
Goldeneye (Very high)	This species was recorded infrequently and only at Parteen Basin. It was not recorded flying near any of the OHLs. This species spends most of its time on open unvegetated waters. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Very high Magnitude: Negligible Significance: Slight Short-term, Slight negative effects
Goosander (High)	This species was only recorded once at Parteen Basin in 2021. It was not recorded flying near any of the OHLs. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Short-term, Not Significant negative effects
Lapwing (Medium)	Lapwing were recorded on a number of occasions throughout the winter surveys on the Headrace, Parteen Basin and on the Lower River Shannon. The Construction Phase would occur during the wintering season, however, it would be short-term in duration, this species is expected to use these habitats post construction. The magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Little grebe (Very low)	Little grebe was encountered infrequently as they foraged on Parteen Basin, the Headrace and the Lower River Shannon. Although this species is considered at high risk of collision with OHLs, it was not recorded flying at collision height or in the ZoI of the existing lines. This species spends most of its time near the shoreline, particularly among reedbeds. The foraging and commuting of this species would be disturbed as a result of the construction of the proposed 38 kV Uprate Works. However, given the majority of habitats within the proposed 38 kV Uprate Works are terrestrial habitats and provide little or no suitable wintering habitat and are sub-optimal for foraging for this species, and as the construction impacts would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Very low Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Mallard (Low)	This species was recorded frequently throughout the study area with commuting flights along the Lower River Shannon, Headrace, open countryside and Parteen Basin. This species regularly commuted in the ZoI of the existing OHLs. Given the short-term nature of the construction works, the temporary nature of the access tracks, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Moorhen (Very low)	Moorhen was encountered infrequently as they foraged on Parteen Basin, the Headrace and the Lower River Shannon. Although this species is considered at high risk of collision with OHLs, it was not recorded flying at collision height or in the ZoI of the existing lines. This species spends most of its time near the shoreline, particularly among reedbeds. Given the short-term nature of the construction works, the temporary nature of the access tracks, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Very low Magnitude: Negligible Significance: Slight Short-term, Slight negative effects
Mute swan (Very high)	This species was recorded consistently at O'Briensbridge during the 2019 breeding surveys with confirmed breeding. The foraging and commuting of this species would be disturbed as a result of the construction of the proposed 38 kV Uprate Works. However, given the majority of habitats within the proposed 38 kV Uprate Works are terrestrial habitats and provide little or no suitable wintering habitat and are sub-optimal for foraging for this species, and as the construction impacts would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Very high Magnitude: Negligible Significance: Slight Short-term, Slight negative effects

Key Ecological Receptor (Collision Sensitivity [EirGrid 2020])	Disturbance/Displacement (Magnitude)	Significance Evaluation*
Pochard (Medium)	This species was recorded infrequently and only at Parteen Basin. It was not recorded flying near any of the OHLs. This species spends most of its time on open unvegetated waters. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Redshank (Medium)	During the 2019/ 20 and 2020/ 21 wintering season, this species was frequently recorded as it foraged along the edges of the Headrace. The foraging and commuting of this species would be disturbed as a result of the construction of the proposed 38 kV Uprate Works. However, given the majority of habitats within the proposed 38 kV Uprate Works are terrestrial habitats and provide little or no suitable wintering habitat, and are sub-optimal for foraging for this species, and as the construction impacts would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Snipe (Medium)	The foraging and commuting of this species would be disturbed as a result of the construction of the proposed 38 kV Uprate Works, however given the majority of habitats within the proposed 38 kV Uprate Works are terrestrial habitats and provide little or no suitable wintering habitat and are sub-optimal for foraging for this species, and as the construction impacts would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Scaup (Medium)	This species was recorded infrequently and only at Parteen Basin. It was not recorded flying near any of the OHLs. This species spends most of its time on open unvegetated waters. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Teal (Low)	This species was recorded infrequently and only at Parteen Basin. It was not recorded flying near any of the OHLs. This species spends most of its time on open unvegetated waters. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Tufted duck (Very high)	Tufted duck were present on Parteen Basin and concentrate near the shoreline in shallower waters on the edges of reed-beds. Tufted duck populations exceeded the 1% national threshold (270) at Parteen Basin in January, November, and December 2020, and January 2021 when they reached 400, 900, 365 and 310 individuals respectively. They were infrequently recorded flying and not observed near any existing OHLs. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Very high Magnitude: Negligible Significance: Slight Short-term, Slight negative effects
Wigeon (Low)	This species was recorded infrequently and only at Parteen Basin. It was not recorded flying near any of the OHLs. This species spends most of its time on open unvegetated waters. Given the proportionately small area of the Lower River Shannon which the OHL is to cross, the presence of an existing OHL, and the availability of alternative habitats in the wider surroundings (i.e. River Shannon catchment), the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects

Key Ecological Receptor (Collision Sensitivity [EirGrid 2020])	Disturbance/Displacement (Magnitude)	Significance Evaluation*
Whooper swan (Medium)	Whooper swan were recorded on Parteen Basin and the open countryside infrequently and in low numbers. They are considered a high-risk species in terms of collision with OHLs. They were recorded flying above the existing OHLs from a VP overlooking the open countryside. The foraging and commuting of this species would be disturbed as a result of the construction of the proposed 38 kV Uprate Works. However, given the majority of habitats within the proposed 38 kV Uprate Works are terrestrial habitats and provide little or no suitable wintering habitat and are sub-optimal for foraging for this species, and as the construction impacts would be short-term in duration, this species is expected to use these habitats post construction. Therefore, the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects
Other Species of Low Conservation Significance (as listed in Section 8.3.5.2.3) (Medium to Very Low)	These species were determined to be less at risk from potential impacts associated with the Proposed Project, as they have a more favourable conservation status, were rarely recorded during surveys, or are not thought to be dependent on the area for wintering or feeding. The majority of habitats within the Proposed Project are sub-optimal for foraging and provide little suitable wintering habitat for these species. Given the short-term duration of the Construction Phase, the wide-ranging nature of some of these species, and the availability of similar suitable habitats in the wider surroundings, the magnitude of the impact is assessed to be of negligible concern.	Sensitivity: Medium to Very Low Magnitude: Negligible Significance: Imperceptible Short-term, Imperceptible negative effects

Note: * Percival Significance Evaluation is calculated as a product of the sensitivity (Table 8.19) of the species and the magnitude (Table 8.20) of the effect.

8.5.5.2 Wintering Birds – Summary of Effects During Construction

776. Table 8.77 summarises the potential Construction Phase impacts and associated effects on wintering birds, whereby in the absence of mitigation measures there is potential for significant effects.

Table 8.77: Summary of Pre-Mitigation Effects Upon Wintering Birds During Construction of the Proposed Project

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Effect	Potential Significant Effect
Parteen Basin, RWI&PS and the Route of the Treated Water Pipeline					
Black-headed gull	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary	Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons. Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance. The construction of the Proposed Project could potentially have a negative impact resulting in a reduction in water quality which could have an indirect impact on water birds. Potential impacts include pollution from the build-up of silt, oil and/or chemical spillage as a result of construction activities in or near watercourses. Furthermore, there is potential for a 'breakout' of bentonite drilling fluid during trenchless water crossings and increases to sediment load as a result of open-cut crossing techniques.	Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Significant negative effects Disturbance/displacement: Short-term, Slight negative effects	Yes
Coot	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary		Habitat loss and fragmentation: Short-term, Not Significant effects Habitat degradation: Short-term, Significant negative effects Disturbance and/or displacement: Short-term, Slight negative effects	Yes
Cormorant	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Significant negative effects Disturbance/displacement: Short-term, Moderate negative effects	Yes
Curlew	Red Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Slight negative effects	No

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Effect	Potential Significant Effect
Gadwall	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare)	Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons. Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance. The construction of the Proposed Project could potentially have a negative impact resulting in a reduction in water quality which could have an indirect impact on water birds. Potential impacts include pollution from the build-up of silt, oil and/or chemical spillage as a result of construction activities in or near watercourses. Furthermore, there is potential for a 'breakout' of bentonite drilling fluid during trenchless water crossings and increases to sediment load as a result of open-cut crossing techniques.	Habitat loss and fragmentation: Short-term, Not Significant effects Habitat degradation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Not Significant effects	No
Golden plover	Red Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), BPS site, County Offaly, Peamount, County Dublin		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Slight negative effects	No
Great crested grebe	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Significant negative effects Disturbance/displacement: Short-term, Slight negative effects	Yes
Goldeneye	Red Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Significant negative effects Disturbance/displacement: Short-term, Moderate negative effects	Yes
Hen harrier	Annex I EC Birds Directive	A small number of peatland habitats along the route of the Treated Water Pipeline in County Offaly		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Slight negative effects	No

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Effect	Potential Significant Effect
Herring gull	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary, Peamount, County Dublin	Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons. Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance. The construction of the Proposed Project could potentially have a negative impact resulting in a reduction in water quality which could have an indirect impact on water birds. Potential impacts include pollution from the build-up of silt, oil and/or chemical spillage as a result of construction activities in or near watercourses. Furthermore, there is potential for a 'breakout' of bentonite drilling fluid during trenchless water crossings and increases to sediment load as a result of open-cut crossing techniques.	Habitat loss and fragmentation: Short-term, Not Significant effects Habitat degradation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Not Significant effects	No
Lapwing	Red Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary, BPS site, County Offaly, Peamount, County Dublin		Habitat loss and fragmentation: Short-term, Moderate negative effects Habitat degradation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Moderate negative effects	Yes
Lesser black-backed gull	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary, Peamount, County Dublin		Habitat loss and fragmentation: Short-term, Not Significant effects Habitat degradation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Not Significant effects	No
Mallard	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary		Habitat loss and fragmentation: Short-term, Not Significant effects Habitat degradation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Not Significant effects	No
Mute swan	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Significant negative effects Disturbance/displacement: Short-term, Moderate negative effects	Yes
Pochard	Red Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Moderate negative effects Disturbance/displacement: Short-term, Slight negative effects	Yes

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Effect	Potential Significant Effect
Redshank	Red Listed (BoCCI)	Parteen Basin, County Tipperary	Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons. Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance. The construction of the Proposed Project could potentially have a negative impact resulting in a reduction in water quality which could have an indirect impact on water birds. Potential impacts include pollution from the build-up of silt, oil and/or chemical spillage as a result of construction activities in or near watercourses. Furthermore, there is potential for a 'breakout' of bentonite drilling fluid during trenchless water crossings and increases to sediment load as a result of open-cut crossing techniques.	Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Slight negative effects	No
Shoveler	Red Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Moderate negative effects Disturbance/displacement: Short-term, Slight negative effects	Yes
Snipe	Red Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary, Peatland sites in County Offaly		Habitat loss and fragmentation: Short-term, Moderate negative effects Habitat degradation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Moderate negative effects	Yes
Teal	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary		Habitat loss and fragmentation: Short-term, Not Significant effects Habitat degradation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Not Significant effects	No
Tufted duck	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Significant negative effects Disturbance/displacement: Short-term, Moderate negative effects	Yes
Whooper swan	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary		Habitat loss and fragmentation: Short-term, Imperceptible effects Habitat degradation: Short-term, Moderate negative effects Disturbance/displacement: Short-term, Slight negative effects	Yes

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Effect	Potential Significant Effect
Wigeon	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary	Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons.	Habitat loss and fragmentation: Short-term, Not Significant effects Habitat degradation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Not Significant effects	No
Other Species of Low Conservation Significance (as listed in Table 8.48 and Table 8.50)	Red, Amber and Green Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary, RWI&PS, WTP, BPS, BPT and TPR sites, County Offaly, Peamount, County Dublin	Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance. The construction of the Proposed Project could potentially have a negative impact resulting in a reduction in water quality which could have an indirect impact on water birds. Potential impacts include pollution from the build-up of silt, oil and/or chemical spillage as a result of construction activities in or near watercourses. Furthermore, there is potential for a 'breakout' of bentonite drilling fluid during trenchless water crossings and increases to sediment load as a result of open-cut crossing techniques.	Habitat loss and fragmentation: Short-term, Imperceptible effects Habitat degradation: Short-term, Slight to imperceptible negative effects Disturbance/displacement: Short-term, imperceptible negative effects	No
38 kV Uprate Works					
Common sandpiper	Amber Listed (BoCCI)	Various locations along the route of the 38 kV Uprate Works, including O'Briensbridge Parteen Basin and along the Headrace County Clare and County Tipperary	Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons. Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance.	Habitat loss and fragmentation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No
Cormorant	Amber Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Slight negative effects	No
Curlew	Red Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Not Significant negative effects	No
Goldeneye	Red Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Slight negative effects	No

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Effect	Potential Significant Effect
Goosander	Amber Listed BoCCI (Breeding Only)	Various locations along the route of the 38 kV Uprate Works, including O'Briensbridge Parteen Basin and along the Headrace County Clare and County Tipperary	Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons. Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance.	Habitat loss and fragmentation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Not Significant negative effects	No
Great crested grebe	Amber Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Not Significant negative effects	No
Green sandpiper	Green Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No
Greylag goose	Amber Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Not Significant negative effects	No
Lapwing	Red Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No
Little Grebe	Green Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No
Mallard	Amber Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No
Moorhen	Green Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Slight negative effects	No

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Effect	Potential Significant Effect
Mute swan	Amber Listed (BoCCI)	Various locations along the route of the 38 kV Uprate Works, including O'Briensbridge Parteen Basin and along the Headrace County Clare and County Tipperary	Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons. Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance.	Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Slight negative effects	No
Pochard	Red Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No
Redshank	Red Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No
Scaup	Red Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No
Snipe	Listed (BoCCI) Red			Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No
Teal	Amber Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No
Tufted duck	Amber Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Slight negative effects	No
Whooper swan	Amber Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No
Wigeon	Amber Listed (BoCCI)			Habitat loss and fragmentation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Effect	Potential Significant Effect
Other Species of Low Conservation Significance (as listed in Section 8.3.5.2.3) (Medium to Very Low)	Red, Amber and Green Listed (BoCCI)	Various locations along the route of the 38 kV Uprate Works, including O'Briensbridge Parteen Basin and along the Headrace County Clare and County Tipperary	Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons. Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance.	Habitat loss and fragmentation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No

8.6 Testing and Commissioning Phase Assessment of Effects

777. During the construction of the Proposed Project, testing would be carried out on individual elements of the works at suitable stages of progression. Final commissioning of the whole works would be undertaken to confirm that the system responds in accordance with its specified requirements.
778. Chapter 5 (Construction & Commissioning) outlines typical approaches to testing the individual elements of the works, and final commissioning of the RWI&PS, treatment and supply of treated water delivery to the termination point in County Dublin.
779. The assessment of effects on biodiversity within the Zol of the Proposed Project during the Testing and Commissioning Phase is undertaken alongside the assessment of effects during the Construction Phase in Section 507.

8.7 Operational Phase Assessment of Effects

780. The following section presents the assessment of effects on biodiversity within the Zol of the Proposed Project during the Operational Phase. The assessment is divided into impacts on:
- Designated Areas of Nature Conservation (Section 8.7.1)
 - Terrestrial Ecology (Section 8.7.2)
 - Terrestrial habitats
 - Habitats and flora
 - Mammals
 - Bats
 - Eurasian badger
 - Otter
 - Other mammal species
 - Invertebrates
 - Lepidoptera
 - Molluscs
 - Other species groups
 - Reptiles and amphibians
 - Aquatic Ecology (Section 8.7.3)
 - Aquatic habitats and plant communities
 - Aquatic macroinvertebrates
 - Protected aquatic species
 - Invasive non-native aquatic species
 - Ornithology – Breeding Birds (Section 8.7.4)
 - Ornithology – Wintering Birds (Section 8.7.5).

781. The identification and description of impacts presented below takes into account the characteristics of the receiving environment as described in Section 8.3, with particular reference to the KERs (Section 8.3.6). The assessment in this section accounts for embedded mitigation that has been incorporated into the design (e.g. site and pipeline route selection during the optioneering stages to avoid sensitive ecological features) but represents a pre-mitigation assessment for potential effects on biodiversity. Section 8.10 describes mitigation measures and Section 8.11 describes residual effects following the implementation of mitigation measures.
782. The operational strategy for the Proposed Project is described in detail in Appendix A4.1 (Operational Strategy).
783. Based on the nature of the Proposed Project and the baseline ecological data collected in the study area, the potential Operational Phase impacts and effects on each of the KERs are summarised in Section 8.7.1 to Section 8.7.5.
784. Potential impacts to both aquatic and terrestrial biodiversity associated with the operation of the Proposed Project are discussed below:
- Abstraction of water from Parteen Basin
 - Permanent noise and vibration disturbance to the surrounding aquatic and terrestrial environment from the operational works associated with the pumping station, including the pumping plant and filter flush out system to clear debris from the microfiltration units, as required
 - Potential ongoing disturbance to habitat(s) and fauna from increased personnel movement within and surrounding the Proposed Project due to ongoing maintenance and repair works
 - Disturbance from security and/or night-time lighting at the RWI&PS, WTP, BPT, BPS, FCV and TPR
 - Temporary noise/disturbance during maintenance and repair activities at Line Valve, Air Valve and Washout Valve sites
 - Spills and/or leaks of pollutants including those from RWI&PS infrastructure into surface and/or groundwater
 - Pollution risk from spills (during cleaning and maintenance and repair works) from machinery and associated infrastructure into surface and/or groundwater
 - Pollution risk from leaks and emergency or non-emergency discharges of treated water from pipeline into surface and/or groundwater.

8.7.1 Designated Areas for Nature Conservation

785. This section describes and assesses the potential for the Proposed Project to result in likely significant effects on designated areas for nature conservation including SACs, SPAs, NHAs, and pNHAs. With regard to European sites, this is focused on the habitats and species for which the sites are selected and the conservation objectives supporting the conservation status for each site. The Proposed Project's potential effect on European sites and protected species has also been assessed separately in the NIS in line with the requirements of Part XAB of the Planning Acts and the Birds Directive and Habitats Directive.
786. In the case of NHAs and pNHAs, the assessment considers whether the Proposed Project would have a likely significant effect on the coherence of ecological structure and function, across the entirety of a site that enables it to sustain all of the biodiversity or ecological resources for which it has been valued (NRA 2009a), with reference to the ecological features of interest for which the site is designated, or is proposed.

8.7.1.1 European Sites

787. The nature and scale of the Proposed Project, and the identified potential impacts in relation to European sites, were considered in order to determine which European sites were within the Zol of the Proposed Project. This was carried out in view of best scientific knowledge and conservation objectives. The potential impacts associated with the Proposed Project are discussed below in relation to those European sites within its Zol (see also Section 5 of the NIS).
788. The Zol is a distance within which the Proposed Project could potentially affect the conservation condition of qualifying interest habitats or qualifying interest/special conservation interest species of a European site. The mechanism to define the Zol (as discussed in Section 8.2.2) is summarised as follows:
- Consider the nature, size and location of the Proposed Project
 - Consider the sensitivities of the ecological receptors
 - Identify impact sources and pathways
 - Determine the Zol based on the extent of the impact.
789. Considering the Zol, in the absence of mitigation measures, the Proposed Project was assessed as having the potential for likely significant effects on the following 19 European sites (refer to Section 6.2 of the NIS):
- Lower River Shannon SAC [002165]
 - Lisduff Fen SAC [002147]
 - Sharavogue Bog SAC [000585]
 - 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]
 - Poulaphouca Reservoir SPA [004063]
 - Middle Shannon Callows SPA [004096].
790. The potential impacts on these European sites are discussed below under the following headings:
- Habitat Loss and Fragmentation
 - Habitat Degradation as a Result of Hydrological Impacts (Water Abstraction)

- Habitat Degradation as a Result of Hydrological Impacts (Repair and Maintenance)
- Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species
- Disturbance/Displacement
- Pollution Risk
- Mortality Risk.

791. It should be noted, the footprint of the Proposed Project overlaps with only one European site, the Lower River Shannon SAC (as discussed in Section 8.3.1). Many of the qualifying interests of the Lower River Shannon SAC are marine/coastal in origin and do not occur within the Zol of the Proposed Project; therefore, there is no potential for the Proposed Project to have a likely significant effect on these qualifying interests (see Section 7.1 of the NIS).

8.7.1.1.1 Habitat Loss and Fragmentation

792. The intake structure would require the removal of a length of the shoreline in order to locate the intake screens, as well as the removal of the reservoir bed (non-Annex I habitat) where the concrete revetment mats would extend (a maximum 55m north to south and extending out a maximum of 27m in an arc) out from the intake to prevent bed scour. The material along the shoreline of the Parteen Basin consists of gravels, pebbles and cobbles, which would be removed as a direct result of the intake. The concrete revetment 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 fauna; however, the mats could potentially prevent the growth of some emergent macrophytes in the immediate shoreline, altering sediment deposition locally around the location of the intake. The presence of the intake structure could also potentially alter local shoreline processes affecting the movement of sediment and water around Parteen Basin margins.

8.7.1.1.2 Habitat Degradation as a Result of Hydrological Impacts (Water Abstraction)

793. 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 Appendix A9.1 Annex A (Hydrological Modelling Report) and Appendix A9.1 Annex B (Water Quality Modelling Report).

794. 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 were 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.

795. 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).

796. 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 events and in the days immediately after the drought (up to a week) when the 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.

797. 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.
798. 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 levels 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 10m³/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.
799. During flood flows, when 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 Lake storage resulting in a lowering of the water level compared with the baseline drought conditions.
800. 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.
801. 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 on Parteen Basin, and would mean no change to the Old River Shannon compensation and fish pass flows always being met.

8.7.1.1.2.1 Climate Change

802. 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.
803. Two sources of climate change information regarding how Irish fluvial flows are projected to change were used and the results compared:
- The 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 Irish Climate Analysis and Research UnitS (ICARUS) (2020) study supplies a means of selecting climate change allowances dependent on catchment characteristics for any location in Ireland.

804. 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 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 Appendix A9.1 Annex A (Hydrological Modelling Report).

8.7.1.1.2.2 Headrace and Tailrace

805. 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 100m³/s for 100 minutes in the baseline, post abstraction (assuming a 2% reduction in flow) this would reduce to 100m³/s for 98 minutes.
806. In reality, much larger variations are currently managed by ESB and power generation is adapted to natural flows 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 assumed in this assessment that ESB would be competent to adjust power generation to reflect the reduced volume available.
807. 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 Appendix A9.1 Annex A (Hydrological Modelling Report).
808. 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 flow 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 0.7m³/s enters the Tailrace via a fish pass. Therefore, in July 2015 the Tailrace received flows of just 0.7m³/s for around 16 hours a day.

809. 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.

8.7.1.1.2.3 Old River Shannon

810. 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.

811. 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.

812. 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 340-400m³/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 lower than experienced in the 1995 drought on Parteen Basin.

813. 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.

814. The hydrological model also demonstrated that with the abstraction in place the statutory 10m³/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.

815. The Water Action Plan 2024 (DHLGH 2024) sets out a roadmap of actions aimed to improve fish migration in the Lower River Shannon around Parteen Weir and the Ardnacrusha power station. An outline Eflow¹¹ approach has been developed by a CDM Smith (2021) study to provide proposed variable compensation flows to be released down the Old River Shannon from Parteen Weir. A sensitivity analysis to the proposed EFlow regime at Parteen Weir (CDM Smith 2021), in which the existing 10m³/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.

¹¹ Environmental flows (Eflows) are considered within the context of the WFD as a hydrological flow regime consistent with the achievement of the environmental objectives of the WFD in natural surface water bodies.

816. 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 10m³/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 10m³/s compensation flow. Full details of the hydrological model Eflows sensitivity analysis are provided in Appendix A9.1 Annex A (Hydrological Modelling Report).

8.7.1.1.2.4 Summary

817. 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.

818. 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 10m³/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.

819. During flood flows, 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 Lake storage resulting in a lowering of the water level compared with baseline flood conditions.

820. 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.

821. 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.
822. 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.
823. 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.
824. 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 a likely significant effect on the qualifying interest habitats or species of the Lower River Shannon SAC.

8.7.1.1.3 Habitat Degradation as a Result of Hydrological Impacts (Repair and Maintenance)

825. The occurrence of leakages or bursts on the pipeline will be continually monitored. In the instance of an imbalance of ‘flow in’ versus ‘flow out’, an alarm is raised to alert the operators (located at the WTP) who can take appropriate action to shut down the pumps and isolate the main as necessary. If there is a substantial leak/burst, then isolation of that section of pipeline would be required. This would be carried out by closing the Line Valves and pumping the treated water in that section around the Line Valve using the piping arrangement at each Line Valve. Any residual water in the section that needs to be removed from the section would be discharged via the Washout Valves in the section. Similarly to any planned event, releases from the Washout Valves as a consequence of draining residual water from an isolated section would be at the controlled rate particular to the receiving water body. Therefore, there would be no hydrological impacts during the Operational Phase, and thus, there are no likely significant negative effects on European sites, at any geographic scale.
826. During the Operational Phase 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. During pipeline operation it is very rare that discharges from Washout Valves are used since they are only required for emptying sections of pipeline if required for emergency repairs or for routine maintenance which is typically every 50 years. These are planned events and would be scheduled to suit landowner constraints and weather conditions. Even then, discharges from Washout Valves would only be used to drain short sections of pipe that cannot be drained to either end of the pipeline section due to the topography.

827. There are 187 Washout Valves currently proposed along the Proposed Project (excluding the Washout Valves incorporated in the bypass pipework at each Line Valve installation, see 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. 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 (Q_{med}).
828. 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 8.78 summarises the location of the temporary outfalls. Potential impacts associated with the temporary discharges relate to chlorine in the water (i.e. the water in the Treated Water Pipeline is treated drinking water), 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 site. 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 (Figure 8.1). Considering none of the Temporary Discharge Locations are located within a European site, there would be no likely significant direct effects on any European site as a result of the temporary discharges.
829. A number of controls and features have been designed into the system for discharging from Washout Valves as follows:
- Discharges would be made using flexible hoses where flow rates permit: discharge rates to land drain discharges from Washout Valves would be limited to a maximum of 15l/s; discharge rates to minor water bodies would be limited to a maximum of 25l/s
 - Discharge to significant water bodies would be limited to a maximum of 20% of the stream's median annual flow (Q_{med})
 - The water would be dechlorinated as necessary and this would be facilitated by the use of an intermediate chamber at each Washout Valve or permanent outfall structure.
830. It is predicted these measures would avoid or reduce any significant effects at or downstream of the temporary discharge locations which would therefore avoid any likely significant direct or indirect effects on any European site.
831. 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 (see Section 8.5.3.1.1). Table 8.79 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 (Figure 8.1).

832. Considering none of the permanent outfalls are located within a European site, there would be no likely significant direct effects on any European site as a result of the permanent outfalls.
833. The permanent outfalls have been designed to minimise the impact of the discharge (should it be required) through the suitable orientation and appropriate engineering design of the outfall structure to dissipate the energy from the discharge. In addition, as previously mentioned, an initial assessment of this capacity has restricted any single discharge to 20% of the associated stream's median annual flood flow rate (Qmed). It is predicted these measures would avoid or reduce any significant scouring of the channel bed and banks around the outfalls as a result of the discharges, which would therefore avoid any likely significant direct or indirect effects on any European site.

Table 8.78: 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
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

Washout Valve ID	Watercourse Reference	Washout Valve Design Flow (l/s)	Approximate Chainage	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
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

Washout Valve ID	Watercourse Reference	Washout Valve Design Flow (l/s)	Approximate Chainage	Pathway to European Site
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
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

Washout Valve ID	Watercourse Reference	Washout Valve Design Flow (l/s)	Approximate Chainage	Pathway to European Site
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
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	21.6km from the River Barrow and River Nore SAC
WB-112	Small ditch/field drain	15	TWD – 17825	14.7km 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	14.4km from the River Boyne and River Blackwater SAC

Washout Valve ID	Watercourse Reference	Washout Valve Design Flow (l/s)	Approximate Chainage	Pathway to European Site
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/Carlton SAC
WB-130	Large ditch/drain	15	TWD – 31880	10.6km from the Rye Water Valley/Carlton SAC
WB-131	Lyreen River	25	TWE – 715	8.1km from the Rye Water Valley/Carlton SAC
WB-132	Baltracy tributary to Lyreen River	25	TWE – 1740	7.7km from the Rye Water Valley/Carlton SAC
WB-133	Small ditch/field drain	15	TWE – 4365	8.0km from the Rye Water Valley/Carlton SAC
WB-134	Small ditch/field drain	15	TWE – 5855	7.3km from the Rye Water Valley/Carlton 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/Carlton 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/Carlton SAC
WB-138	GA1	15	TWE – 12325	Discharge over agricultural land, no pathway to European site
WB-139	Unnamed Stream	15	TWE – 13945	5.9km from the Rye Water Valley/Carlton SAC
WB-140	Small ditch/field drain	15	TWE – 14145	5.8km from the Rye Water Valley/Carlton 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 8.79: 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	Ardregane Stream	45	TW – 13490	5.7km from the Lough Derg (Shannon) SPA
WA-010	Ardregane Stream	100	TW – 15665	4.5km from the Lough Derg (Shannon) SPA
WA-011	Ardregane Stream	35	TW – 16455	4km from the Lough Derg (Shannon) SPA
WA-013	Nenagh	150	TW – 19500	4km from the Lough Derg (Shannon) SPA
WA-014	Ardcrony River	115	TW – 26465	4.2km from Lough Derg, North-East Shore SAC
WA-015	Shesherahmore	60	TW – 30810	7.3km from Lough Derg, North-East Shore SAC

Washout Valve ID	Watercourse Reference	Washout Valve Design Flow (l/s)	Approximate Chainage	Pathway to European Site
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
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/Carlton SAC
WA-036	Clonshanbo	55	TWE – 2430	7.3km from the Rye Water Valley/Carlton SAC
WA-037	Lyreen	30	TWE – 3585	7.4km from the Rye Water Valley/Carlton SAC
WA-038	Ardress Lower	50	TWE – 9105	7.0km from the Rye Water Valley/Carlton SAC
WA-039	Liffey	150	TWE – 9825	7.1km from the Rye Water Valley/Carlton SAC
WA-040	Reeves	75	TWE – 11415	7.3km from the Rye Water Valley/Carlton 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

Note: * Of WA-001 and WA-002 only one would be required to be constructed. This would be confirmed at detailed design, however, to assess potential environmental impacts both are assessed.

834. For watercourses crossed by the trenchless technique, no Operational Phase impacts are anticipated. For watercourses crossed by the 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.
835. Downstream European sites with a hydrological pathway from the Proposed Project and features of interest sensitive to changes to the aquatic environment are:
- Lower River Shannon SAC
 - Lough Derg (Shannon) SPA
 - Lough Derg, North-East Shore SAC

- Sharavogue Bog SAC
- Lisduff Fen SAC
- Dovegrove Callows SPA
- River Shannon Callows SAC
- Middle Shannon Callows SPA
- River Barrow and River Nore SAC
- South Dublin Bay SAC
- South Dublin Bay and River Tolka Estuary SPA
- River Boyne and River Blackwater SAC
- River Boyne and River Blackwater SPA
- Rye Water Valley/Carnton SAC.

836. The potential for adverse effects on each of these European sites was considered and assessed in the NIS (see Table 6.2 in the NIS). 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. 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 an impact on the remaining downstream European sites with features of interest sensitive to changes to the aquatic environment, which have the potential to result in short-term to permanent, likely significant negative effects, at the international geographic scale.

8.7.1.1.4 Habitat Degradation as a Result of Pollution

837. 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 'over the edge' to a hardcore longitudinal soakaway along both edges of the road. 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 taken into the Intake Chamber and the Raw Water Rising Mains Scour Tank respectively. The site would not be manned and so foul wastewater generated by operational staff on the site is estimated at less than 1m³/d and would be tankered from the Wastewater Holding Tank to a licensed Wastewater Treatment Plant. Further details of this are provided in Chapter 4 (Proposed Project Description). The net result is that there would be no impact on water quality from the RWI&PS during the Operational Phase, and thus no likely significant negative effects on European sites, at any geographic scale.

838. Provision has been made to allow each of the twin RWRMs to be emptied to a 2,600m³ 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 RWRMs would also be important in the control of INNS including zebra mussels and quagga mussels, 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 can 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 and their veligers in the system prior to the water entering the microfiltration module. A programme of preventative maintenance would determine the frequency of this.

839. 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.
840. Overall, the risk of pollution impacts during the Operational Phase of the Proposed Project is unlikely, and thus there is no likely significant negative effects on any European site, at any geographical scale.

8.7.1.1.5 Habitat Degradation as a Result of Introducing or Spreading Invasive Non-Native Species

841. 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 includes three Inlet Chambers, each fitted with a PWWC Intake Screen, to prevent debris or fish (including eels), being taken up into 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 PWWC Intake Screens would be manufactured in a copper nickel alloy material to minimise the risk of zebra mussel attachment, some proactive antifouling 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 antifouling measures would be non-toxic internal coatings on pipework manufactured in copper-nickel alloy (with space provision for permanganate dosing of the raw water flow in the Raw Water Rising Mains, if necessary). These would discourage adhesion, or treat the raw water flow after intake. None of these measures would have any effect on any waters.
842. Microfilters (Amiad Filters) 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 wash water to an INNS debris retention tank, located above the RWRM 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 an ultraviolet (UV) treatment unit to deactivate any zebra mussel juveniles (veligers) before being returned to the PWWC Intake Screen inlet basin and 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.
843. Invasive non-native species have been recorded within or in close proximity to the Proposed Project (Section 8.3.3.9). Therefore, routine repair and maintenance works have the potential to accidentally cause their introduction/spread to areas within European sites downstream of the Proposed Project. This has the potential to have likely, long-term, negative significant effects on species composition, diversity and abundance in affected areas at an international scale (worst-case scenario).

8.7.1.1.6 Disturbance/Displacement

844. There would 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 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 (Chapter 4: Proposed Project Description). 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. Otter 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, 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 habituate to the presence of operational activities. Thus, disturbance/displacement impacts on the conservation status of otter due to increased human activity, noise and/or lighting associated with the RWI&PS during the Operational Phase are unlikely and thus, there is no likely significant negative effects, at any geographic scale.
845. 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 provide three RWI 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 (approximately 2.0m in diameter) 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, there would be no 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 would not affect the conservation objective attributes and targets supporting the conservation condition of these species in the Lower River Shannon SAC.
846. 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, none of which are located close enough to the Proposed Project to experience these potential effects directly. The closest SPA site is Slievefelim to Silvermines Mountains SPA which is located 1.5km south-east of the Proposed Project.

8.7.1.1.7 Mortality Risk

847. It is proposed to provide three RWI points, each fitted with a PWWC Intake Screen, to prevent debris and/or fish or eels 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 (approximately 2.0m in diameter) 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 to aquatic KERs in Parteen Basin during the Operational Phase of the Proposed Project are unlikely, and thus there are no likely significant negative effects on aquatic fauna, at any geographic scale.

8.7.1.2 Natural Heritage Areas and Proposed Natural Heritage Areas

848. As discussed in Section 8.5.1.2, there are 24 NHAs and 102 pNHAs within 15km of the Proposed Project (Table 8.24), many of which overlap with a European site and are therefore considered under European sites (Section 8.7.1.1). Of the remaining 16 NHAs and 60 pNHAs, 11 were found to have a source-pathway-receptor with the Proposed Project (Table 8.24). These include:

- Screggan Bog NHA
- Annaghmore Lough Fen (Offaly) pNHA
- Willsborough Esker pNHA
- Cloonlara House pNHA
- Birr (Domestic Dwelling No. 1, Occupied) pNHA
- Birr (Domestic Dwelling No. 2, Occupied) pNHA
- Kinnitty (Domestic Dwelling, Occupied) pNHA
- Bracken's Dwelling, Near Whiteford pNHA
- Clonad Wood pNHA
- Mount St. Joseph Woods pNHA
- Miltown, Shinrone pNHA.

849. In the absence of appropriate design measures or mitigation, there may be a potential for likely significant negative effects from pollution of surface and/or groundwater. During operation of the Proposed Project, there would be no routine discharges to the surface water environment with the exception of rare, planned discharges from Washout Valves. Washout Valves, which would be located at low points along the pipeline, would be used during commissioning of the pipeline for removing silt and sediment which may have accumulated during the Construction Phase. During pipeline operation it is very rare that these valves would be used, and would generally only be required for emptying sections of pipeline if required for emergency repairs or for routine maintenance programmes every 50 years. The location and number of Washout Valves presented in Chapter 4 (Proposed Project Description) are considered to be the maximum, worst-case scenario, requirement. Exact locations of the Washout Valves and their associated infrastructure would be agreed during detailed design; however, for the purposes of this assessment it is assumed discharges from Washout Valves during drain-down events may go to watercourses connected to the following pNHAs and NHAs:

- Screggan Bog NHA
- Annaghmore Lough Fen (Offaly) pNHA
- Willsborough Esker pNHA
- Clonad Wood pNHA
- Mount St. Joseph Woods pNHA.

850. No other pNHAs or NHAs would be impacted by discharges from Washout Valves as these are the only sites with a hydrological pathway from the Proposed Project.

851. For the purposes of this assessment, certain design requirements have been committed to, as follows:

- Planned repair and maintenance would only occur in low flow periods
- Line Valves have been sited where feasible at a field boundary and adjacent to the public road to facilitate plant access and repair and maintenance. The pipeline arrangement at each Line Valve is designed to maximise the potential to pump treated water around the Line Valves to sections not being maintained. This reduces the quantity of water to be discharged to the environment

- Washout Valves would be provided at low points along the proposed pipeline and would discharge through an outlet chamber to allow for the provision of dechlorination chemicals prior to discharge to a watercourse. Washout Valves with a permanent outfall have been designed to minimise the impact of the discharge by proposing a suitable orientation and appropriate engineering design to dissipate the energy from the discharge. They would also include the construction of a chamber to facilitate the use of dechlorination media
- Any water that is discharged must be fit for release. This usually takes the form of a mobile treatment unit such as a 'Siltbuster' which can be used for both solids removal (during commissioning only) and dechlorination by chemical dosing with sodium thiosulphate
- Washout Valves 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 Office of Public Works (OPW) requirements subject to the applicable permitting regime and would follow a drain down strategy which matches flow to capacity of the receiving watercourse to prevent scour, erosion and increased sediment load in the receiving watercourses.

852. Following implementation of the above embedded design requirements to control discharges from Washout Valves during drain-down events, there would be no impact on water quality as a result of surface and/or groundwater pollution during the Operational Phase of the Proposed Project; and therefore, habitat degradation as a consequence of operational impacts on water quality would not result in a likely significant effect on the features of interest of the designated pNHAs and NHAs with a source-pathway-receptor to the Proposed Project. Furthermore, considering releases from the Washout Valves would be controlled in accordance with EPA and OPW requirements and will be subject to the applicable permitting regime and planned to ensure receiving watercourses have capacity to accept the discharges, it is considered the hydrological effects on the structure and function of the water-dependent habitats (Scraggan Bog NHA and Annaghmore Lough Fen (Offaly) pNHA only, i.e. Willsborough Esker pNHA, Clonad Wood pNHA, and Mount St. Joseph Woods pNHA are not water-dependent habitats) would be temporary, and thus there are no likely significant negative effects on the sites, at any geographic scale.
853. Five of the pNHAs located within 15km of the Proposed Project are protected for bat roosts and were found to have a potential impact pathway with the Proposed Project (Table 8.24). All five sites are located greater than 1km from the Proposed Project. Due to the distance from the Proposed Project, direct or indirect impacts from light spill, noise or disturbance during the Operational Phase would not affect these bat roost sites.

8.7.1.3 Designated Areas for Nature Conservation – Summary of Effects During the Operational Phase

854. Table 8.80 summarises the potential Operational Phase impacts and associated effects on designated area for nature conservation as a result of the Proposed Project. In the absence of mitigation measures, there is potential for significant effects to nine SACs and four SPAs.

Table 8.80: Summary of Pre-Mitigation Effects Upon Designated Areas for Nature Conservation During the Operational Phase of the Proposed Project

Key Ecological Receptor	Evaluation	Area	Potential Operational Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
European Sites	International	Lower River Shannon SAC	Habitat loss and fragmentation	Habitat loss and fragmentation associated with the intake structure and concrete revetment mats. Revetment mats could potentially prevent the growth of emergent macrophytes in the immediate shoreline, altering sediment deposition around the location of the RWI.	No likely significant effect at any geographic scale.
			Habitat degradation as a result of hydrological impacts (water abstraction)	The hydrological model demonstrates 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 of the qualifying interest habitats or species of the Lower River Shannon SAC.	No likely significant effect at any geographic scale.
			Habitat degradation as a result of pollution risk	There are potential sources of water quality contamination from the RWI&PS. However, as a result of the design of site oil and chemical storage and drainage systems, there would be no likely significant effects.	No likely significant effect at any geographic scale.
			Disturbance/displacement	- Noise levels from operational water pumps are not predicted to exceed the Popper <i>et al.</i> (2014) criteria for continuous noise - Increased human presence, noise, and lighting associated with the Operational Phase of the Proposed Project (e.g. general repair and maintenance and inspections) has the potential to temporarily disturb, and potentially displace, birds from important habitat areas (supporting habitats outside of any European site). However, these disturbances are not predicted to compromise the integrity of the site.	No likely significant effect at any geographic scale.
			Mortality risk	There is no risk of mortality to aquatic fauna in Parteen Basin during the Operational Phase	No likely significant effect at any geographic scale.

Key Ecological Receptor	Evaluation	Area	Potential Operational Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
European Sites	International	- 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/Carlton SAC - Charleville Wood SAC - River Boyne and River Blackwater SAC - River Shannon Callows SAC - Lough Derg (Shannon) SPA - Dovegrove Callows SPA - River Shannon and River Fergus Estuaries SPA - River Boyne and River Blackwater SPA - Middle Shannon Callows SPA	Habitat degradation as a result of hydrological impacts (repair and maintenance)	- Potential impact from Washout Valves and discharge outfalls located along the pipeline used for repair and maintenance (typically every 50 years). The Proposed Project design has restricted discharges from Washout Valves during drain-down events to 20% of the associated stream's median annual flow rate (Qmed) and included a dechlorination chamber. Washout Valves with temporary discharges will require dechlorination media brought to site. - Failure of seal resulting in a leak to potable water which contains traces of chlorine and requirement of repair plant and equipment which may have the potential for leakage of fuel/lubricants - For watercourses crossed by the 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. Potential impacts resulting in bank destabilisation and changes to morphology of rivers/streams. As a result, there could be changes in the flow and sediment processes within the channel.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Short-term to permanent - Extent: International geographic scale

Key Ecological Receptor	Evaluation	Area	Potential Operational Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
European Sites	International	- 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 Shannon and River Fergus Estuaries SPA - River Boyne and River Blackwater SPA - Middle Shannon Callows SPA	Habitat degradation as a result of introducing or spreading INNS	- Potential impact from the attachment of zebra mussels on intake pipes becoming clogged and/or result in the transfer of mussels from the Parteen Basin. - Other non-native species recorded in the study area may potentially spread during routine repair and maintenance works 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.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Long-term - Extent: Local to international geographic scale
NHAs and pNHAs	National	- Scraggan Bog NHA, - Annaghmore Lough Fen (Offaly) pNHA - Willsborough Esker pNHA - Clonad Wood pNHA - Mount St. Joseph Woods pNHA	Habitat degradation as a result of hydrological impacts	Potential impact of discharges from Washout Valves, which would be used during commissioning of the pipeline for removing silt and sediment which may have accumulated during the Construction Phase (in addition to infrequent maintenance every 50 years).	No likely significant effect at any geographic scale.

8.7.2 Terrestrial Ecology

855. This section describes the predicted Operational Phase impacts on terrestrial ecology, under the following headings:

- Habitats and Flora (Section 8.7.2.1)
- Mammals (Section 8.7.2.2 to Section 8.7.2.5)
 - Bats
 - Eurasian Badger
 - Otter
 - Other Mammal Species
- Invertebrates (Section 8.7.2.7)
 - Lepidoptera
 - Molluscs
- Other Species Groups (Section 8.7.2.8)
 - Reptiles and Amphibians.

8.7.2.1 Habitats and Flora

8.7.2.1.1 *Habitat and Rare/Protected Flora Loss and Habitat Fragmentation*

856. Without appropriate mitigation measures in place, the most significant loss and impact on terrestrial habitats and rare/protected flora would be during the Construction Phase of the Proposed Project. Upon completion of the Proposed Project, all areas would be generally restored to pre-existing ground conditions, allowing for some settling, with the exception of PB1 and PF2 habitats, and WL2 habitats over the 20m wide Permanent Wayleave. All temporary works facilities would also be removed, and these sites would be reinstated. Reseeding would be carried out on completion of topsoil spreading (Chapter 5: Construction & Commissioning). Landscape planting would generally reestablish in the short-term and mature in the medium to long-term, reducing the magnitude of negative effects introduced at the construction stage.

8.7.2.1.2 *Habitat Degradation as a Result of Hydrogeological Impacts (Preferential Flow)*

857. During the Operational Phase, there is a potential for preferential flow along the pipeline backfill material. The potential for flow along the pipeline is slight due to the small cross-sectional area, groundwater conditions and frequent changes in elevation (Chapter 10: Soils, Geology and Hydrogeology). Along sections of the Treated Water Pipeline where gradients increase, drainage along the pipeline could occur within the bedding material. In the absence of mitigation, where land drainage pipes are intercepted and not replaced, the potential for water level increase or localised ponding occurs due to the disconnection of the land drainage. In sensitive locations such as wetlands, potential to alter the hydrogeological environment occurs.

858. Localised ponding or alterations to the hydrogeological environment could result in a transition of habitat type over time and a loss of dry meadows and grassland. Within the Proposed Project, dry meadows and grassland habitats were found mainly along roadsides and occurred infrequently in discrete pockets. None of the areas of this habitat type encountered were noted as having a high species diversity. Thus, impacts associated with localised ponding or alterations to the hydrogeological environment are not predicted to affect terrestrial habitats and flora and therefore, there are no likely significant negative effects, at any geographic scale. Furthermore, studies have shown ponds can increase total catchment richness and the number of rare plant species (particularly freshwater plants) and could bring some biodiversity benefits to agricultural catchments (Williams *et al.* 2020).

8.7.2.1.3 *Habitat Degradation as a Result of Hydrological Impacts (Discharges from Washout Valves)*

859. There are limited opportunities for the Treated Water Pipeline to result in impacts on terrestrial habitats and flora during operation. The activity most likely to result in an impact is the operation of the Washout Valves, either as part of planned maintenance or in an emergency situation.
860. It is very rare for these valves to be used; approximately once every 50 years. Nevertheless, the potential effects could be significant given the volume of water that would be discharged in these events, particularly local discharges from Washout Valves to adjacent land (i.e. where there are no field drains or small ditches within 100m of the Washout Valve; 40 locations in total along the Proposed Project). Habitat degradation impacts include damage to vegetation caused by flooding. In addition, the water in the Treated Water Pipeline is treated drinking water and as such is required to contain a certain amount of chlorine to maintain quality along its length. Chlorine can be toxic to sensitive plants and damage seedlings (Frink and Bugbee 1987). Existing terrestrial habitats within the Proposed Project where these local discharges from Washout Valves during drain-down events are located, include: BC1, GA1, GS4, PB4, WD4, and WN7. Of these, GS4 and WN7 are considered to be of local importance (higher value) and therefore are KERs. Five of the 40 washout valves with local discharges are located within these two KER habitats (Table 8.78).
861. As noted, during the Operational Phase, these events would be very rare and impacts would be temporary. Temporary effects over a period of days are likely to be negative and would affect the habitats at the five Washout Valve locations, resulting in a temporary, likely significant negative effect, at a local geographic scale.

8.7.2.1.4 *Habitats and Flora – Summary of Effects During the Operational Phase*

862. Table 8.81 summarises the potential Operational Phase impacts and associated effects on terrestrial habitats. In the absence of mitigation measures there is potential for significant effects.

Table 8.81: Summary of Pre-Mitigation Effects Upon Terrestrial Habitats During the Operational Phase of the Proposed Project

Key Ecological Receptor	Evaluation	Area	Potential Operational Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
Wet grassland (GS4 high local)	Local importance (higher value)	WB-011 (TW – 14270), County Tipperary	Habitat degradation as a result of local discharges from Washout Valves (treated water) to adjacent land.	Potential for rare (every 50 years) and temporary impacts (over a period of days) resulting in a likely significant negative effect at a local geographic scale for the habitats at the five Washout Valves with local discharge to adjacent land (Table 8.78).	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Temporary - Extent: Local geographic scale
Bog woodland (WN7)	Local importance (higher value)	- WB-114 (TWD – 19270), County Kildare - WB-115 (TWD – 20240), County Kildare - WB-118 (TWD – 21330), County Kildare - WB-119 (TWD – 22620), County Kildare			
Cutover bog (PB4 high local)	Local importance (higher value)	- WB-071 (TWC – 13200), County Offaly - WB-072 (TWC – 3500), County Offaly - WB-089 (TWD – 2800), County Offaly - WB-099 (TWD – 6700), County Offaly - WB-100 (TWD – 6900), County Offaly - WB-101 (TWD – 7100), County Offaly - WB-102 (TWD – 7400), County Offaly - WB-104 (TWD – 12100), County Kildare - WB-105 (TWD – 12900), County Kildare - WB-106 (TWD – 14100), County Kildare - WB-116 (TWD – 20700), County Kildare - WB-121 (TWD – 23400), County Kildare			
Conifer plantation (WD4)	Local importance (higher value)	WB-128 (TWD – 30400), County Kildare			

8.7.2.2 Mammals – Bats

863. Once construction is complete and the Proposed Project is operational, works would be limited to routine regular inspections of the 20m wide Permanent Wayleave and valves, and general repair and maintenance. This work would take place during daylight hours and is unlikely to affect the conservation status of bats, thus there are no likely significant negative effects, at any geographic scale.
864. In relation to the 38 kV Uprate Works, vegetation trimming may be required to enable access to each structure to complete development works or to ensure the viability of the OHL or structure is not reduced by these features. The majority of trimming carried out for the Proposed Project would be ongoing maintenance trimming. This trimming would be carried out on a routine basis by ESBN to control the vegetation growing in close proximity to the structures and OHLs. Maintenance trimming is not linked to the proposed 38 kV Uprate Works and is carried out regardless, therefore, it is not considered an impact arising from the proposed 38 kV Uprate Works. The main potential source of impact in relation to bat species is therefore trimming of vegetation of the hedgerows/treelines straddled by or in close proximity to structures or along access routes to polesets. It is important to note few hedgerows/treelines would be impacted by the 38 kV Uprate Works (approximately 650m of hedgerows and treelines that may require trimming) with a large proportion of corridors remaining untouched. As such, the vegetation trimming would be unlikely to affect the conservation status of the local bat population, and thus, there are no likely significant negative effects, at any geographic scale.
865. An increased human presence at the RWI&PS, WTP, BPT, BPS, FCV and TPR may cause disturbance to a number of bat species foraging in these areas and potentially cause a change to established flight patterns. However, human activity during the Operational Phase is expected to generally occur during daylight hours. Furthermore, treelines and hedgerows in the surrounding landscape outside the Proposed Project may provide alternative suitable habitats for foraging and commuting bats.
866. As the infrastructure sites would be lit at night for safety and security (Chapter 4: Proposed Project Description), there is potential for disturbance to bats due to lighting. Exterior lighting specification would meet the lighting guidelines (BCT 2023) and would be automatically controlled and would be turned off unless operational staff are present on-site. As discussed in Section 8.5.2.2.4, bats' eyesight works best in dim light conditions; where there is too much luminance bats' vision can be reduced resulting in disorientation. Disturbance and/or displacement effects on bat species during the Operational Phase may affect the conservation status of the local bat populations, and thus there is potential for permanent, likely significant negative effects, at a local geographic scale.

8.7.2.2.1 Bats – Summary of Effects During the Operational Phase

867. Table 8.82 summarises the potential Operational Phase impacts and associated effects of the Proposed Project on bats. In the absence of mitigation measures, there is potential for significant effects.

Table 8.82: Summary of Pre-Mitigation Effects Upon Bats During the Operational Phase of the Proposed Project

Key Ecological Receptor	Evaluation	Area	Potential Operational Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
Common pipistrelle	Local importance (higher value)	Common and widespread throughout the Proposed Project (Figure 3e in Appendix A8.9: Bat Surveys Report).	Light disturbance	All infrastructure would be lit at night for safety and security resulting in potential for disturbance to bats that are known to roost/forage/commute in those areas.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent - Extent: Local geographic scale
Soprano pipistrelle	Local importance (higher value)	Common and widespread throughout the Proposed Project (Figure 3f in Appendix A8.9: Bat Surveys Report).			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent - Extent: Local geographic scale
Leisler's bat	Local importance (higher value)	Common and widespread throughout the Proposed Project (Figure 3g in Appendix A8.9: Bat Surveys Report).			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent - Extent: Local geographic scale
Daubenton's bat	Local importance (higher value)	Less common but widely distributed throughout the Proposed Project. Tend to be recorded on watercourses. One tree roost recorded outside the Proposed Project in Parteen Woodland (Figure 3i in Appendix A8.9: Bat Surveys Report).			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent - Extent: Local geographic scale
Natterer's bat	Local importance (higher value)	Less common but widely distributed throughout the Proposed Project (Figure 3j in Appendix A8.9: Bat Surveys Report).			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent - Extent: Local geographic scale

Key Ecological Receptor	Evaluation	Area	Potential Operational Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
Whiskered bat	County	Less common bat species with a more restricted distribution. The majority of records were concentrated in Counties Tipperary and Offaly (Figure 3k in Appendix A8.9: Bat Surveys Report).	Light disturbance	All infrastructure would be lit at night for safety and security resulting in potential for disturbance to bats that are known to roost/forage/commute in those areas.	- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent - Extent: Local geographic scale
Nathusius' pipistrelle	Local importance (higher value)	Infrequently recorded along the Proposed Project (Figure 3h in Appendix A8.9: Bat Surveys Report)			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent - Extent: Local geographic scale
Brown long-eared bat	Local importance (higher value)	Less common but widely distributed throughout the Proposed Project. Tend to be recorded along woodland or treeline habitats (Figure 3m in Appendix A8.9: Bat Surveys Report).			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent - Extent: Local geographic scale
Lesser horseshoe bat	International	Lesser horseshoe bat was only recorded once during the array of surveys and this was located north-west of Birdhill (Figure 3l in Appendix A8.9: Bat Surveys Report).			- Quality of effects: Negative - Significance: Significant effect - Probability: Likely - Duration: Permanent - Extent: Local geographic scale

8.7.2.3 Mammals – Eurasian Badger

868. Along the length of the Proposed Project, any displacement effects during construction would no longer occur during the Operational Phase as the land would be reinstated and supplemented with landscape planting. Operational works would be limited to routine regular inspections of the 20m wide Permanent Wayleave and valves, and general repair and maintenance. The level of operational activity is expected to be sufficiently low to avoid any disturbance impacts on badgers that use the location of the Proposed Project. It is considered that these impacts would be temporary and thus, there are no likely significant negative effects on the badger population, at any geographic scale.
869. During the Construction Phase, high-fenced perimeters and locked gates would be put in place around the RWI&PS, WTP, BPT, BPS, FCV and TPR sites as a security measure. This fencing would remain in place throughout the Operational Phase. This fencing would be mammal-proof and would therefore reduce the total foraging area available to badgers (52.1ha, i.e. total area of all the infrastructure sites). However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, there are no likely significant negative effects on badger populations, at any geographic scale.

8.7.2.4 Mammals – Otter

870. Along the length of the Proposed Project, any displacement effects during construction would no longer occur during the Operational Phase as the land would be reinstated and supplemented with landscape planting. Operational works would be limited to routine regular inspections of the 20m wide Permanent Wayleave and valves, and general repair and maintenance. The level of operational activity is expected to be sufficiently low to avoid any disturbance impacts on otters that use the location of the Proposed Project. It is considered that these impacts would be temporary and would not affect the conservation status of the local otter populations, thus they are no likely significant negative effects, at any geographic scale.
871. During the Construction Phase, high-fenced perimeters and locked gates would be put in place around the RWI&PS, WTP, BPT, BPS, FCV and TPR sites as a security measure. This fencing would remain in place throughout the Operational Phase. This fencing would be mammal-proof and would therefore reduce the total foraging area available to otters (2.32ha). It should be noted the total area of all key infrastructure sites is 52.1ha; however, only the area at the RWI&PS site is considered to have suitable habitats for otter. Given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts on the conservation status of otter are unlikely, and thus, there are no likely significant negative effects on otter populations, at any geographic scale.
872. A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitat for otter and other protected fauna around the margins of Parteen Basin. A hydrological model analysis (which included a range of climatic conditions including climate change scenarios) was carried out to examine the difference between pre-work (recorded) and post-work (simulated) water levels in Lough Derg and Parteen Basin as a result of water supply abstraction (Appendix A9.1 Annex A (Hydrological Modelling Report)). It was found, throughout the 52 years analysed (1972 to 2023), water levels would have remained within the Normal Operating Band on Lough Derg and within the upper and lower water levels that ESB apply to Parteen Basin, and the statutory compensatory flow over Parteen Weir would have been provided. Therefore, it is expected there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effects (Chapter 9: Water). It can therefore be concluded that impacts on the conservation status of the local otter populations as a result of the water abstraction are unlikely and thus, there are no likely significant negative effects, at any geographic scale.

8.7.2.5 Mammals – Other Mammal Species

873. Along the length of the Proposed Project, any displacement effects during construction would no longer occur during the Operational Phase as the land would be reinstated and supplemented with landscape planting. Operational works would be limited to routine regular inspections of the 20m wide Permanent Wayleave and valves, and general repair and maintenance. The level of operational activity is expected to be sufficiently low to avoid any disturbance impacts on protected mammals that use the location of the Proposed Project. It is considered that these impacts would be rare and temporary, and thus, there are no likely significant negative effects on populations of other mammal species, at any geographic scale.
874. During the Construction Phase, high-fenced perimeters and locked gates would be put in place around the RWI&PS, WTP, BPT, BPS, FCV and TPR sites as a security measure. This fencing would remain in place throughout the Operational Phase. This fencing would be mammal-proof and would therefore reduce the total foraging area (52.1ha, i.e. total area of all key infrastructure sites) available to mammals such as pine marten and other faunal species protected under the Wildlife Acts. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, there are no likely significant negative effects on populations of other mammal species, at any geographic scale.

8.7.2.6 Mammals – Summary of Effects During the Operational Phase

875. Table 8.83 summarises the potential Operational Phase impacts and associated effects of the Proposed Project on mammals. There would be no likely significant effects.

Table 8.83: Summary of Pre-Mitigation Effects Upon Mammals During the Operational Phase of the Proposed Project

Key Ecological Receptor	Evaluation	Area	Potential Operational Phase Impact(s)	Assessment of Potential Impact	Potential Significant Effect
Eurasian badger	Local importance (higher value)	RWI&PS, WTP, BPT, BPS, FCV and TPR sites	Loss of foraging habitat	Fencing around the RWI&PS, WTP, BPT, BPS, FCV and TPR sites would reduce the total foraging area available to mammals such as badger, otter, pine marten and other faunal species protected under the Wildlife Acts. Given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are not considered to be significant.	No likely significant effect at any geographic scale.
Otter	International	- RWI&PS, WTP, BPT, BPS, FCV and TPR sites - Parteen Basin	- Disturbance/displacement - Loss of foraging habitat - Water level impacts	- Routine regular inspections of the 20m wide Permanent Wayleave and valves, and general repair and maintenance - Fencing around the RWI&PS, WTP, BPT, BPS, FCV and TPR sites would reduce the total foraging area available to mammals such as badger, otter, pine marten and other faunal species protected under the Wildlife Acts. Given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are not considered to be significant. - Reduction in water level due to water abstraction could result in alteration of the distribution and abundance of suitable otter foraging habitat around margins of Parteen Basin. However, following hydrological modelling, normal levels are expected to remain. It is expected there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effect.	No likely significant effect at any geographic scale.
Other faunal species protected under the Wildlife Acts	Local importance (higher value)	RWI&PS, WTP, BPT, BPS, FCV and TPR sites	Loss of foraging habitat	Fencing around the RWI&PS, WTP, BPT, BPS, FCV and TPR sites would reduce the total foraging area available to mammals such as badger, otter, pine marten and other faunal species protected under the Wildlife Acts. Given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are not considered to be significant.	No likely significant effect at any geographic scale.

8.7.2.7 Invertebrates

8.7.2.7.1 *Lepidoptera*

876. Any temporary loss of habitats suitable for marsh fritillary and possible mortality of these individuals within local populations during the Construction Phase would no longer occur during the Operational Phase as the land would be reinstated and supplemented with landscape planting. Operational works would be limited to routine regular inspections of the 20m wide Permanent Wayleave and valves, and general repair and maintenance. The level of above-ground operational activity is expected to be sufficiently low and is not likely to affect the conservation status of marsh fritillary that use the Proposed Project, thus there are no likely significant negative effects, at any geographic scale.

8.7.2.7.2 *Molluscs*

877. Any temporary or permanent loss of habitats suitable for molluscs and possible mortality of individuals within local populations during the Construction Phase, would no longer occur during the Operational Phase as the land would be reinstated and supplemented with landscape planting. Operational works would be limited to routine regular inspections of the 20m wide Permanent Wayleave and valves, and general repair and maintenance. The level of above-ground operational activity is expected to be sufficiently low to and is not likely to affect molluscs that use the Proposed Project, thus there are no likely significant negative effects, at any geographic scale.

8.7.2.7.3 *Invertebrates – Summary of Effects During the Operational Phase*

878. Table 8.84 summarises the potential Operational Phase impacts and associated effects of the Proposed Project on invertebrates. There would be no likely significant effects.

Table 8.84: Summary of Pre-Mitigation Effects Upon Invertebrates During the Operational Phase of the Proposed Project

Key Ecological Receptor	Evaluation	Area	Potential Operational Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
Marsh fritillary	International	Money and Clonarrow/ Riverlyons County Offaly Cushaling, Island and Ticknevin, County Kildare	N/A	No likely significant effects on marsh fritillary	No likely significant effect at any geographic scale.
Mollusc species (Lilljeborg's whorl snail and brown snail)	County	Tipperary	N/A	No likely significant effects on mollusc species	No likely significant effect at any geographic scale.

8.7.2.8 Other Species Groups

8.7.2.8.1 *Reptiles and Amphibians*

879. Any temporary loss of habitats suitable for common frog or newts, and possible mortality of these individuals within local populations during the Construction Phase, would no longer occur during the Operational Phase as the land would be reinstated and supplemented with landscape planting. Operational works would be limited to routine regular inspections of the 20m wide Permanent Wayleave and valves, and general repair and maintenance. The level of above-ground operational activity is expected to be sufficiently low and is not likely to affect common frog or newts that use the Proposed Project, thus there are no likely significant negative effects, at any geographic scale.

880. Following implementation of the design requirements outlined to control discharges from Washout Valves during drain-down events (Section 8.7.3.1), there would be no impact on habitats suitable for common frog or newts during the operation of the proposed pipeline, thus there are no likely significant negative effects, at any geographic scale.

8.7.2.8.2 Other Species Groups – Summary of Effects During the Operational Phase

881. Table 8.85 summarises the potential Operational Phase impacts and associated effects of the Proposed Project other species. There would be no likely significant effects.

Table 8.85: Summary of Pre-Mitigation Effects Upon Other Species Groups During the Operational Phase of the Proposed Project

Key Ecological Receptor	Evaluation	Area	Potential Operational Phase Impact(s)	Assessment of Potential Impact	Summary of Effect
Common frog	Local importance (higher value)	Incha Beg, County Tipperary Common throughout the Proposed Project	N/A	No potential impacts identified	No likely significant effect at any geographic scale.
Smooth newt	Local importance (higher value)	Incha Beg, County Tipperary	N/A	No potential impacts identified	No likely significant effect at any geographic scale.

8.7.3 Aquatic Ecology

882. This section describes the predicted Operational Phase impacts on aquatic ecology, under the following headings:

- Aquatic Ecology
 - Aquatic Habitats and Plant Communities (Section 8.7.3.1)
 - Protected Aquatic Species (Section 8.7.3.2).

883. The potential Operational Phase impacts on aquatic ecology as a result of the Proposed Project are assessed in this section. As described in Chapter 4 (Proposed Project Description) and Appendix A4.1 (Operational Strategy) the following Operational Phase activities and infrastructure may affect aquatic flora and fauna:

- At the RWI&PS:
 - Abstraction of water
 - Changes in hydrology
 - Presence of an intake structure and associated infrastructure along the lake shoreline
 - Cleaning, repair and maintenance of infrastructure
- Along the Treated Water Pipeline:
 - Discharge from Washout Valves and Line Valves to local watercourses.

884. The WTP is located within an area of agricultural land with no formal watercourses crossed. The closest 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. This water body is not designated as a salmonid river, is assigned a 'moderate' WFD status 2019-2024 and is identified as at 'At Risk'. 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 of any operational discharges to the Tank Draindown Management and Commissioning Lagoons during

repair and maintenance (Chapter 4: Proposed Project Description and Appendix A4.1: Operational Strategy). The WTP site (as distinct from the plant), is not a completely closed system. Drainage from roofs uses a closed system, captured to the same lagoons. The section that is not closed 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 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. 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.

885. 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 (Chapter 4: Proposed Project Description). The closest water body to the BPT is the Ballyfinboy_040 (SC: 25_3690) which is located approximately 1.45km west of the site at its closest point. This water body is not designated as a European site and is not designated as a salmonid river. The water body is assigned a 'moderate' WFD status 2019-2024 and is identified as 'At Risk'. 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.
886. The BPS site is located within a rural area of agricultural land adjacent to the L3003. The BPS paved areas would be designed to incorporate Sustainable Urban Drainage Systems (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 and is not designated as a salmonid river. The water body is assigned a 'good' WFD status 2019-2024 and is identified as 'Not at Risk'. 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.
887. 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 and is not designated as a salmonid river. The water body status is assigned a 'good' WFD status 2019-2024 and is under review in terms of risk. Surface water run-off from the FCV would be drained into a infiltration (soakaway) pond via filter drains which would 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.

888. 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_170 (SC: 09_1131; Lucan Stream) which is located approximately 610m north-east of the site at its closest point. This water body is not designated as a European site and is not designated as a salmonid river. The water body is assigned a 'poor' WFD status 2019-2024 and is identified as 'At Risk'. 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.
889. The RWI&PS is located in Parteen Basin which forms part of the Lower River Shannon SAC; thus, the operation and repair and maintenance of the proposed intake works would be undertaken in such a way as to minimise any potentially likely significant effects on the qualifying interests in the SAC. The potential significant effects on aquatic ecology associated with the operation of the RWI&PS and the Treated Water Pipeline, in the absence of appropriate mitigation measures in place, are described herein.

8.7.3.1 Aquatic Habitat and Plant Communities

8.7.3.1.1 Habitat Loss and Fragmentation

8.7.3.1.1.1 Raw Water Intake and Pumping Station

890. As discussed in Section 8.3.3.6, currently within the Lower River Shannon SAC, sea lamprey spawning appears to be confined to the Old River Shannon downstream of Parteen Weir. There would be no likely significant effect on this habitat as a result of the Proposed Project. Brook lamprey are associated with small streams and are not likely to occur in Parteen Basin. Their distribution is not currently documented within the Lower River Shannon SAC. River lamprey spawning is recorded in the vicinity of Plassey, County Limerick in the Old River Shannon and is likely to occur at suitable habitat upstream as far as Parteen Weir and on the River Mulkear. There are no data to suggest that this species occurs upstream of the Ardnacrusha or Parteen Weirs. No lamprey ammocoetes were retrieved from any of the cores taken at the proposed RWI&PS site in 2017 or 2019 and there was no visible evidence of ammocoete burrows recorded in any of the soft sediments (Appendix A8.17: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2017) and Appendix A8.18: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2019)). No suitable spawning habitat for salmon was found during the aquatic ecological survey at the RWI&PS site (Appendix A8.17: Aquatic Ecological Survey at the Proposed Parteen Basin Abstraction Site (August 2017) and 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. Overall, it is anticipated there is likely to be a low adverse magnitude of impact on fish habitats in Parteen Basin as a result of the intake structure and revetment mat. Thus, habitat loss is unlikely to have any long-term impact on the fish habitat in Parteen Basin and therefore there are no likely significant negative effects, at any geographic scale.

8.7.3.1.2 Habitat Degradation as a Result of Pollution

8.7.3.1.2.1 Raw Water Intake and Pumping Station

891. The RWI&PS has been designed such that potential impacts associated with pollution from surface water runoff or wastewater are avoided (Section 8.7.1.1.4). Thus, pollution impacts on aquatic habitats and plant communities during the Operational Phase are not likely to occur.

892. A hydrological model and a water quality model of Lough Derg and Parteen Basin (which included a range of climatic conditions including climate change scenarios) were 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 level and water quality of Lough Derg and Parteen Basin (Appendix A9.1 Annex A (Hydrological Modelling Report) and Appendix A9.1 Annex B (Water Quality Modelling Report)). Based upon the outputs of the water quality modelling for Lough Derg and Parteen Basin, impacts of a negligible magnitude are predicted in a drought scenario as a result of the Proposed Project. The very slight changes in water quality are imperceptible and less than the natural variability of the system, and therefore the effect of the abstraction in a drought scenario can be considered negligible (Chapter 9: Water). Thus, given the negligible impacts on water quality, there are no likely significant negative effects on aquatic flora and fauna KERS, at any geographic scale.

8.7.3.1.2.2 Proposed 20m Wide Permanent Wayleave

893. During the Operational Phase there is a potential for chemically treated water to enter watercourses crossed by the Proposed Project. No routine discharges to the surface water environment would occur with the exception of rare, planned discharges from Washout Valves. Washout Valves, which would be located at low points along the Treated Water Pipeline, would be used during commissioning of the pipeline for removing silt and sediment which may have accumulated during the Construction Phase. The need to drain a section of the pipeline in operation would be a very rare event, at a typical frequency of once in every 50 years, but the design has carefully considered and provided for the circumstances where this could arise. These are planned events and would be scheduled to suit landowner constraints and weather conditions. Even then, discharges from Washout Valves during drain-down events are only used to drain short (typically less than 500m) sections of pipe that cannot be drained to either end of the pipeline section due to the topography. The target draindown time is approximately 12 hours for any given section.

894. Detail on the number and location of Washout Valves (which are considered to be the maximum and worst-case scenario) and their associated infrastructure is provided in Chapter 4 (Proposed Project Description).

895. The number of Washout Valves is dependent on 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 (Q_{med}). This is engineered by a combination of the strategic location of Line Valves to isolate sections of pipeline and by limiting the draindown in any given section. The principal features are:

- Washout Valves would include a secondary guard valve to ensure reliable operation under a range of conditions including emergencies. This also permits the Washout Valves to be regularly 'exercised' to ensure they are fully operational without the need to discharge water, since one or other of the valves can remain closed at all times
- Washout Valves with a permanent outfall have been designed to minimise the impact of the discharge (should it be required) through the suitable orientation and appropriate engineering design of the outfall structure to dissipate the energy from the discharge. They would also include the construction of a chamber to facilitate the use of dechlorination media (dechlorination tablets). Discharges from Washout Valves where there is no permanent outfall would require dechlorination equipment to be brought to site as part of the operational procedure
- Washout Valves do not require a power supply, as operation is by a standard 'valve key and bar' which can be operated manually
- Washout Valves would be directly buried below the surface and can be re-excavated in the very rare event of a problem that requires the valve to be replaced. The valves would incorporate extended telescopic spindles accessed via surface boxes at ground level.

896. Discharges from the pipeline would require dechlorination prior to discharge to the environment. This would 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 would be reduced to below <0.005mg/L, as required by the Quality of Salmonid Waters Regulations (1988). All sweetening flow discharges (required during the commissioning phase) would be monitored for chlorine residual, and de-chlorinated prior to entering any watercourse as part of the embedded design measures. Refer to Appendix A4.1 (Operational Strategy) for further details.
897. Following implementation of the above embedded design measures to control discharges from Washout Valves, there would be no impact on water quality during the operation of the Proposed Project and thus there are no likely significant negative effects on the aquatic habitats or plant community KERs, at any geographic scale.

8.7.3.1.3 *Habitat Degradation as a Result of Water Abstraction (Raw Water Intake and Pumping Station)*

898. The potential impacts associated with water abstraction from Parteen Basin are discussed in detail in Section 8.7.1.1.2 and Chapter 9 (Water), Appendix A9.1 Annex A (Hydrological Modelling Report) and Appendix A9.1 Annex B (Water Quality Modelling Report). A summary of the assessments made in relation to the effects on hydrology, water quality and hydromorphology of Parteen Basin and Lough Derg are as follows:
- Hydrology (water levels): There would be no impact or negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would not result in any likely significant effects.
 - Water Quality: Parteen Basin and Lough Derg are very sensitive; however, it is predicted there would be a negligible magnitude of impact, which would not result in any likely significant effects.
 - Hydromorphology: It is predicted there would be a negligible magnitude of impact on Parteen Basin as a result of the intake structure and revetment mats. Considering the low sensitivity of Parteen Basin, there would be no likely significant effects. Based upon the negligible impacts on lake levels, impacts on the hydromorphology of Lough Derg are also considered to be negligible and therefore no likely significant effects are predicted.
899. With regards to rivers flowing into Lough Derg and Parteen Basin, the Shannon (Lower)_050, Shannon (Lower)_060, the Headrace, the Tailrace, and Limerick Dock, the magnitude of impacts in relation to hydrology, water quality, and hydromorphology are predicted to be negligible, resulting in no likely significant effects on any of these surface water bodies (Appendix A9.1: Abstraction Assessment).
900. Considering water abstraction from Parteen Basin would not significantly change the current hydrology, water quality and hydromorphology of Lough Derg and Parteen Basin or any upstream and downstream surface water bodies, there are no likely significant negative effects on aquatic KERs, at any geographic scale.

8.7.3.1.4 *Habitat Degradation as a Result of Hydrological Impacts*

8.7.3.1.4.1 *Raw Water Intake and Pumping Station*

901. In Chapter 9 (Water), Appendix A9.1 Annex A (Hydrological Modelling Report) and Appendix A9.1 Annex B (Water Quality Modelling Report) the potential effects on hydrology were assessed for rivers flowing into Lough Derg and Parteen Basin, the Headrace and Tailrace, and the Old River Shannon, and are summarised as follows:

- Rivers flowing into Lough Derg and Parteen Basin: Negligible magnitude of impact on the flow in the Lower River Shannon and water bodies feeding into Lough Derg and Parteen Basin which would have no significant effects
- Headrace and Tailrace: There would be no impact on the flow rate on the Headrace itself, rather there would be a reduction in time period over which the power station would operate. 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, if the flow down the Headrace was at 100m³/s for 100 minutes in the baseline, post abstraction (assuming a 2% reduction in flow) this would reduce to 100m³/s for 98 minutes. 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. At Ardnacrusha Generating Station, the abstraction would represent the equivalent of a slightly drier climate. As ESB manages much larger variations in flows without foresight, it is expected that ESB would be competent to adjust power generation to reflect the reduced volume available. It is expected that ESB would continue to concentrate power generation around times of peak energy demand. The magnitude of impact on the Headrace is therefore negligible and not significant. The flow rate on the Tailrace has also been considered to be negligible. The Tailrace is not a HMWB and its lower reaches are within the Lower River Shannon SAC. As a result, its sensitivity is defined as high. The impacts on the Tailrace from the reduction in volume are likely to be not significant
- Old River Shannon: There would be a negligible magnitude of impact on the flow in the Lower River Shannon which would not be significant as a result.

902. Considering the Proposed Project would not significantly alter the existing flow regime of the rivers flowing into Lough Derg and Parteen Basin, the Headrace and Tailrace, and the Old River Shannon, aquatic flora and fauna of the Lower River Shannon SAC are not likely to be affected by hydrological impacts.

8.7.3.1.4.2 Proposed 20m Wide Permanent Wayleave

903. Washout Valves along the proposed 20m wide Permanent Wayleave could lead to the removal of riparian vegetation, increased suspended sediment, scouring, and destabilisation of the channel beds and banks within the Zol of the outfall locations. However, considering releases from the Washout Valves would be controlled in accordance with EPA and OPW requirements and will be subject to the applicable permitting regime and plans to ensure receiving watercourses have capacity to accept the discharges (Section 8.7.1.2), it is considered hydrological impacts on aquatic habitats (i.e. riparian corridor, channel banks and bed substrate) would be temporary and unlikely, and thus, there are no likely significant negative effects, at any geographic scale. In the instances where a fixed pipeline is required with a headwall discharge arrangement to a watercourse (Table 8.79; Chapter 4: Proposed Project Description), it is considered there would be a permanent negative impact on aquatic habitats (i.e. loss of local riparian vegetation). However, considering the extent of suitable alternative habitat in the immediate vicinity of the fixed pipeline infrastructure, there are no likely significant negative effects, at any geographic scale.
904. The occurrence of leakages or bursts on the pipeline will be continually monitored. In the instance of an imbalance of 'flow in' versus 'flow out', an alarm is raised to alert the operators (located at the WTP) who can take appropriate action to shut down the pumps and isolate the main as necessary. If there is a substantial leak/burst, then isolation of that section of pipeline would be required. This would be carried out by closing the Line Valves and pumping the treated water in that section around the Line Valve using the piping arrangement at each Line Valve. Any residual water in the section that needs to be removed from the section would be discharged via the Washout Valves in the section. Similarly to any planned event, releases from the Washout Valves as a consequence of draining residual water from an isolated section, would be at the controlled rate particular to the receiving water body. Thus, there are no likely significant negative hydrological effects on aquatic habitats (i.e. riparian corridor, channel banks and bed substrate) at any geographic scale.

8.7.3.2 Protected Aquatic Species

8.7.3.2.1 Habitat Degradation as a Result of Discharges from Washout Valves

905. Following implementation of the design requirements outlined to control discharges from Washout Valves during drain-down events (Section 8.7.3.1), there would be no impact on water quality during operation of the proposed pipeline, thus there are no likely significant negative effects on aquatic KERs, at any geographic scale.

8.7.3.2.2 Disturbance/Displacement

906. Subacoustech Environmental Ltd. undertook underwater noise modelling of operational noise of water pumps in Parteen Basin (Appendix A8.20: Underwater Noise Modelling Report). As noted in Section 8.2.5.2.4, 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.
907. 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 should reach minimum recorded background levels in Parteen Basin within 550m of the water intake when operating at the maximum abstraction rate (300Mld). Therefore, disturbance and/or displacement associated with the operation of the water pumps is not likely to have any population level effects, and thus there are no likely significant negative effects on fish species, at any geographic scale.

8.7.3.2.3 Mortality or Injury to Aquatic Fauna

908. It is proposed to provide three RWI points, each fitted with a PWWC Intake Screen, to prevent debris and/or fish or eels 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 (approximately 2.0m in diameter) are limited to 0.15m/s, the velocity at which juvenile fish can swim away without being trapped against the screen. A Bubble Curtain would also be provided at the inlet openings to the Intake Chamber. A 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) discouraging fish from entering the intake. Therefore, mortality or injury to aquatic KERs in Parteen Basin during the Operational Phase of the Proposed Project is unlikely, and thus, there are no likely significant negative effects, at any geographic scale.

909. 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). Fish descending the system may do so through several routes; the turbines at Ardnacrusha Generating Station, the spillway at Parteen regulating weir, or the two fish passes located at Ardnacrusha Station and Parteen Weir. 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 Water Action Plan 2024 (DHLGH 2024) references actions aimed at improving fish migration in the Lower River Shannon around Parteen Weir and the Ardnacrusha power station. The Proposed Project would not alter the existing scenario by creating any additional barrier effects and risks of mortality to aquatic KERs in Parteen Basin during the Operational Phase and thus, there are no likely significant negative effects, at any geographic scale.

8.7.3.3 Aquatic Ecology – Summary of Effects During the Operational Phase

910. Table 8.86 summarises the potential Operational Phase impacts and associated effects of the Proposed Project on aquatic ecology. There would be no likely significant effects.

Table 8.86: Summary of Pre-Mitigation Effects Upon Aquatic Ecology During the Operational Phase of the Proposed Project

Key Ecological Receptor	Evaluation	Area		Potential Operation Phase Impact(s)	Summary of Effects
Watercourses (FW1, FW2, FW3) ranked as being of 'high ecological value' (Appendix A8.14: Watercourse Crossing Data)	International (Cumulatively – for fisheries, habitats and protected fauna)	Watercourses with discharges from permanent and temporary Washout Valves listed on Table 8.78 and Table 8.79.		- Habitat degradation associated with hydrological impacts. The Washout Valves along the 20m wide Permanent Wayleave could lead to the removal of riparian vegetation, increased sediment loading, scouring and destabilisation of the channel beds and banks within the Zol of outfall locations - Habitat degradation as a result of pollution and possible leaks resulting in a discharge. The Operational Phase has the potential for chemically treated water to enter watercourses crossed by the Proposed Project - Risk of chemically treated water entering watercourses crossed by the Proposed Project – design requirements include control of discharges from Washout Valves during drain-down events, i.e. use of dechlorination tablets - Leakage or burst on the pipeline which may result in an unplanned discharge – design requirements to monitor any potential leaks.	No likely significant effect at any geographic scale.
Watercourses (FW1, FW2, FW4) ranked as being of 'medium ecological value'. (Appendix A8.14: Watercourse Crossing Data)	County importance (cumulatively – for fisheries, habitats and protected fauna)	Watercourses with discharges from permanent and temporary Washout Valves listed on Table 8.78 and Table 8.79.			
Watercourses (FW1, FW2, FW4) ranked as being of 'low ecological value'. (Appendix A8.14: Watercourse Crossing Data)	Local importance (higher value) (cumulatively – for fisheries, habitats and protected fauna)	Watercourses with discharges from permanent and temporary Washout Valves listed on Table 8.78 and Table 8.79.			
White-clawed crayfish	International importance – Annex II and V of Habitats Directive and Wildlife Acts	- PSNWBX005 (38 kV) - PSNWBX007 (38 kV) - PSNWBX010 (38 kV) - PSNWCX001 (38 kV) - PSNWCX004 (38 kV) - WBX027 (TWA – 14800) - WBX030 (TWA – 21100) - WBX038 (TWB – 4600) - WBX039 (TWB – 4800) - WBX057 (TWC – 6900) - WBX058 (TWC – 10000) - WBX062 (TWC – 11100) - WBX088 (TWE – 14200) - WBX092 (TWB – 13600) - WBX094 (TWB – 19100) - WBX097 (TWB – 11000) - WBX107 (TWB – 4700) - WCX001 (power connection along R445) - WCX002 (access road) - WCX003 (TW – 700) - WCX004 (TW – 1000) - WCX005 (TW – 7500) - WCX006 (TW – 8500) - WCX013 (TW – 16500) - WCX016 (TW – 19500)	- WCX021 (TW – 35000) - WCX026 (TWA – 13000) - WCX027 (TWA – 24800) - WCX029 (TWA – 24800) - WCX031 (TWA – 26000) - WCX032 (TWA – 27600) - WCX034 (TWB – 6600) - WCX035 (TWB – 7800) - WCX036 (TWB – 12600) - WCX039 (TWB – 24900) - WCX042 (TWC – 5000) - WCX048 (TWC – 18900) - WCX049 (TWC – 20300) - WCX056 (TWD – 4200) - WCX057 (TWD – 6400) - WCX059 (TWD – 14400) - WCX061 (TWD – 24300) - WCX062 (TWD – 26400) - WCX067 (TWE – 700) - WCX069 (TWE – 2400) - WCX070 (TWE – 3600) - WCX071 (TWE – 9000) - WCX072 (TWE – 9100) - WCX073 (TWE – 9800) - WCX074 (TWE – 11400) - WCX077 (power connection along R494) - WCX078 (power connection along the R440) - WCX085 (power to line valve TWC – 17500)	- Disturbance/displacement associated with operational noise of water pumps. This noise may cause behavioural effects such as avoidance - The RWI points have the potential to cause mortality or injury if this species becomes trapped in the intake system/ pipes. - Habitat degradation associated with hydrological impacts. The Washout Valves along the 20m wide Permanent Wayleave could lead to increased sediment loading, scouring and destabilisation of the channel beds and banks within the Zol of outfall locations.	No likely significant effect at any geographic scale.
Freshwater pearl mussel	International importance – Annex II and V of Habitats Directive and Wildlife Acts	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.		No predicted impacts.	No likely significant effect at any geographic scale.

Key Ecological Receptor	Evaluation	Area		Potential Operation Phase Impact(s)	Summary of Effects
Atlantic salmon	International importance – Annex II and V of Habitats Directive	• PSNWBX005 (38 kV) • PSNWBX010 (38 kV) • PSNWCX001 (38 kV) • PSNWCX002 (38 kV) • PSNWCX003 (38 kV) • PSNWCX004 (38 kV) • WBP011 (TWA – 15300) • WBP309 (TWC – 700) – Potential spawning only • WBX008 (TW – 3500) • WBX010 (TW – 4000) • WBX012 (TWA – 4900) – Potential spawning habitat only • WBX025 (TWA – 12100) • WBX027 (TWA – 14800) – Potential spawning habitat only • WBX034 (TWA – 27200) – Potential spawning habitat only • WBX030 (TWA – 21100) • WBX038 (TWB – 4600) • WBX039 (TWB – 4800) • WBX057 (TWC – 6900) • WBX058 (TWC – 10000) • WBX060 (TWC – 10300) – Potential spawning habitat only • WBX061 (TWC – 10400) – Potential spawning habitat only • WBX062 (TWC – 11100) • WBX078 (TWD – 15100) • WBX092 (TWB – 13600) • WBX094 (TWB – 19100) • WBX097 (TWB – 11000) • WBX107 (TWB – 4700) • WBX109 (access route to TWD - 14400) • WBX112 (power connection along R440) • WCX001 (power connection along R445) • WCX002 (access road along R445) • WCX003 (TW – 700) – Potential spawning habitat only • WCX004 (TW – 1000) • WCX005 (TW – 7500) – Potential spawning habitat only • WCX006 (TW – 8500) • WCX008 (TW – 10200) • WCX012 (TW – 15000) • WCX013 (TW – 16500) • WCX016 (TW – 19500) • WCX021 (TW – 35000) • WCX023 (TWA – 5600)	• WCX024 (TWA – 8000) – Potential spawning habitat only • WCX025 (TWA – 9400) • WCX026 (TWA – 1300) – Potential spawning habitat only • WCX027 (TWA – 17500) • WCX028 (TWA – 23800) • WCX029 (TWA – 24800) • WCX031 (TWA – 26000) • WCX032 (TWA – 27600) • WCX033 (TWB – 1400) • WCX034 (TWB – 6600) • WCX035 (TWB – 7800) • WCX036 (TWB – 12600) • WCX039 (TWB – 24900) • WCX040 (TWC – 1000) – potential spawning habitat only • WCX041 (TWC – 3300) – potential spawning habitat only • WCX042 (TWC – 5000) • WCX045 (TWC – 9700) • WCX048 (TWC – 18900) • WCX049 (TWC – 20300) – potential spawning habitat only • WCX054 (TWC – 22800) – potential spawning habitat only • WCX056 (TWD – 4200) • WCX057 (TWD – 6400) • WCX058 (TWD – 8900) • WCX059 (TWD – 14400) • WCX060 (TWD – 18100) • WCX061 (TWD – 24300) • WCX062 (TWD – 26400) • WCX065 (TWD – 29100) • WCX066 (TWD – 32700) • WCX068 (TWE – 1800) • WCX069 (TWE – 2400) • WCX070 (TWE – 3600) • WCX073 (TWE – 9800) • WCX077 (power connection along R494) • WCX078 (power connection along R440) • WCX079 (power to line valve TWD – 8000) • WCX082 (power to line valve TWC – 22900) • WCX083 (power to line valve TWD – 12700) • WCX085 (power to line valve TWC - 17500)	• Disturbance/displacement associated with operational noise of water pumps. This may cause behavioural effects such as avoidance • The RWI points have the potential to cause mortality or injury if this species becomes trapped in the intake system/ pipes • Habitat degradation associated with hydrological impacts. The Washout Valves along the 20m wide Permanent Wayleave could lead to increased sediment loading, scouring and destabilisation of the channel beds and banks within the Zol of outfall locations.	No likely significant effect at any geographic scale.

Key Ecological Receptor	Evaluation	Area		Potential Operation Phase Impact(s)	Summary of Effects
Lamprey species	International importance – Annex II of Habitats Directive	• PSNWBX005 (38 kV) • PSNWBX010 (38 kV) • PSNWCX001 (38 kV) • PSNWCX002 (38 kV) • PSNWCX003 (38 kV) • WBP309 (TWC – 700) – Potential spawning habitat only • WBX001 (access road) • WBX002 (RWA Access Road) • WBX008 (TW – 3500) • WBX010 (TW – 4000) – Potential spawning habitat only • WBX017 (TW – 19200) • WBX023 (TWA – 7800) • WBX026 (TWA – 13200) • WBX027 (TWA – 14800) • WBX030 (TWA – 21100) • WBX033 (TWA – 21300) • WBX034 (TWA – 27200) • WBX038 (TWB – 4600) • WBX039 (TWB – 4600) • WBX057 (TWC – 6900) • WBX058 (TWC – 10000) • WBX060 (TWC – 10300) – Potential spawning habitat only • WBX061 (TWC – 10400) – Potential spawning habitat only • WBX062 (TWC – 11100) • WBX088 (TWE – 14200) • WBX092 (TWB – 13600) • WBX093 (TWB – 14800) • WBX094 (TWB – 19100) • WBX097 (TWB – 11000) • WBX107 (TWB – 4700) • WCX001 (power connection along R445) • WCX002 (access road) • WCX003 (TW – 700) • WCX004 (TW – 1000) • WCX005 (TW – 7500) • WCX006 (TW – 8500) • WCX008 (TW – 10200) • WCX009 (TW – 10500) • WCX010 (TW – 11200) • WCX012 (TW – 15000) – potential spawning habitat only • WCX013 (TW – 16500) • WCX016 (TW – 19500) • WCX021 (TW – 35000)	• WCX023 (TWA – 5600) • WCX024 (TWA – 8000) – Potential spawning habitat only • WCX026 (TWA – 13000) • WCX027 (TWA – 17500) • WCX028 (TWA – 23800) – Potential spawning habitat only • WCX029 (TWA – 24800) • WCX031 (TWA – 26000) – Potential spawning habitat only • WCX032 (TWA – 27600) • WCX033 (TWB – 1400) • WCX034 (TWB – 6600) • WCX035 (TWB – 7800) • WCX036 (TWB – 12600) • WCX039 (TWB – 24900) • WCX040 (TWC – 1000) – potential spawning habitat only • WCX041 (TWC – 3300) – potential spawning habitat only • WCX042 (TWC – 5000) • WCX043 (TWC – 5600) • WCX044 (TWC – 8900) • WCX045 (TWC – 9700) • WCX048 (TWC – 18900) • WCX049 (TWC – 20300) • WCX054 (TWC – 22800) • WCX056 (TWD – 4200) • WCX057 (TWD – 6400) • WCX058 (TWD – 8900) • WCX059 (TWD – 14400) • WCX061 (TWD – 24300) • WCX062 (TWD – 26400) • WCX064 (TWD – 28500) • WCX065 (TWD – 29100) • WCX066 (TWD – 32700) • WCX068 (TWE – 1800) • WCX069 (TWE – 2400) • WCX070 (TWE – 3600) • WCX073 (TWE – 9800) • WCX077 (power connection along R494) • WCX078 (power connection along R440) • WCX079 (power to line valve TWD – 8000) • WCX085 (power to line valve TWC – 17500)	• Disturbance/displacement associated with operational noise of water pumps. This may cause behavioural effects such as avoidance • The RWI points have the potential to cause mortality or injury if this species becomes trapped in the intake system/ pipes. • Habitat degradation associated with hydrological impacts. The Washout Valves along the 20m wide Permanent Wayleave could lead to increased sediment loading, scouring and destabilisation of the channel beds and banks within the Zol of outfall locations.	No likely significant effect at any geographic scale.

Key Ecological Receptor	Evaluation	Area	Potential Operation Phase Impact(s)	Summary of Effects
European eel	County importance	WCX039 (TWB – 24788)	- Disturbance/displacement associated with operational noise of water pumps. This may cause behavioural effects such as avoidance - The RWI points have the potential to cause mortality or injury if this species becomes trapped in the intake system/ pipes. - Habitat degradation associated with hydrological impacts. The Washout Valves along the 20m wide Permanent Wayleave could lead to increased sediment loading, scouring and destabilisation of the channel beds and banks within the Zol of outfall locations.	No likely significant effect at any geographic scale.
All other fish species	Local importance (higher value)	Identified in a number of locations throughout the Proposed Project	- Disturbance/displacement associated with operational noise of water pumps. This may cause behavioural effects such as avoidance - The RWI points have the potential to cause mortality or injury if this species becomes trapped in the intake system/ pipes. - Habitat degradation associated with hydrological impacts. The Washout Valves along the 20m wide Permanent Wayleave could lead to increased sediment loading, scouring and destabilisation of the channel beds and banks within the Zol of outfall locations.	No likely significant effect at any geographic scale.

8.7.4 Ornithology – Breeding Birds

8.7.4.1 Key Species of Conservation Significance

911. Potential impacts on breeding avian communities during the Operational Phase, within the study area of the Proposed Project, have been divided into three main types: habitat loss and fragmentation (Section 8.7.4.1.1), disturbance/displacement (Section 8.7.4.1.2), and collision risk (Section 8.7.4.1.3). The operational strategy for the Proposed Project is described in detail in Appendix A4.1 (Operational Strategy).

8.7.4.1.1 *Habitat Loss and Fragmentation*

912. Table 8.87 assesses the potential effect of habitat loss and fragmentation, in the absence of mitigation, on KER avian species observed within the Proposed Project. The methodology of assessment of the effects of habitat loss and fragmentation is in accordance with Percival (2003) (Section 8.2.7.4). The magnitude of impact is determined based on the proportion of habitat which would be lost relative to the availability of habitats which are used by KER avian species both on-site and within the wider surroundings.

913. Following completion of the proposed 38 kV Uprate Works, cutting and trimming of trees and vegetation is required to ensure that the minimum corridor widths are maintained throughout the life of the operational powerline, which is currently the case. Such activities are unlikely to affect conservation status of any breeding bird species, and thus there are no likely significant negative effects, at any geographic scale.

Table 8.87: Assessing the Pre-Mitigation Effect of Habitat Loss and Fragmentation on Breeding Key Ecological Receptor Avian Species due to Operational Phase Activities

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Barn owl (Medium)	This species was recorded foraging on three occasions during the 2016 and 2024 breeding bird surveys and was confirmed to be breeding as an incidental record during a bat survey in 2025. The Proposed Project would result in permanent habitat loss which may result in a permanent loss of potential foraging habitat for barn owl. When considering that this species was rarely recorded, that there are extensive areas of suitable foraging habitat available adjacent to the Proposed Project and in the wider landscape, but while also noting the loss of a breeding area, impacts associated with loss habitat are considered medium.	Sensitivity: Medium Magnitude: Medium Significance: Moderate Permanent, Moderate negative effects
Black-headed gull (High)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. The results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effect. It can therefore be concluded that the magnitude of the impact is of negligible concern. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for breeding birds. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Permanent, Not Significant negative effects
Coot (High)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. The results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effect. It can therefore be concluded that the magnitude of the impact is of negligible concern. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for breeding birds. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Permanent, Not Significant negative effects
Curlew (High)	During the route selection process, hydrogeologically sensitive areas were avoided where practicable (Chapter 3: Consideration of Reasonable Alternatives). However, during the Operational Phase along the 20m wide Permanent Wayleave the presence of the subsurface Treated Water Pipeline could impact the existing hydrological regime resulting in a potential reduction or loss of water-dependent habitats such as wet grasslands and peatlands used by breeding waders. In order to eliminate the potential for drainage of water-dependent habitats, standard construction methods and pipeline designs would be implemented to prevent groundwater flow along the pipeline (Chapter 5: Construction & Commissioning). With these design measures in place, it is predicted hydrological impacts on soils, subsoils or bedrock during the Operational Phase of the Proposed Project (Chapter 10: Soils, Geology and Hydrogeology) would not result in a likely significant negative effect on the availability of suitable habitat for breeding waders, at any geographic scale. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for breeding birds. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Permanent, Not Significant negative effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Grey wagtail (Medium)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. The results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effect. It can therefore be concluded that the magnitude of the impact is of negligible concern. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for breeding birds. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Great crested grebe (High)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. The results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effect. It can therefore be concluded that the magnitude of the impact is of negligible concern. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for breeding birds. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Permanent, Not Significant negative effects
Hen harrier (High)	The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for breeding birds. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Permanent, Not Significant negative effects
Kestrel (Medium)	The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Kingfisher (Medium)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. The results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effect. It can therefore be concluded that the magnitude of the impact is of negligible concern. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for breeding birds. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Lapwing (Medium)	During the route selection process, hydrogeologically sensitive areas were avoided where practicable (Chapter 3: Consideration of Reasonable Alternatives). However, during the Operational Phase along the 20m wide Permanent Wayleave the presence of the subsurface Treated Water Pipeline could impact the existing hydrological regime resulting in a potential reduction or loss of water-dependent habitats such as wet grasslands and peatlands used by breeding waders. In order to eliminate the potential for drainage of water-dependent habitats, standard construction methods and pipeline designs would be implemented to prevent groundwater flow along the pipeline (Chapter 5: Construction & Commissioning). With these design measures in place, it is predicted, hydrological impacts on soils, subsoils or bedrock during the Operational Phase of the Proposed Project (Chapter 10: Soils, Geology and Hydrogeology), would not result in a likely significant negative effect on the availability of suitable habitat for breeding waders, at any geographic scale. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for breeding birds. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Mallard (Low)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. The results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effect. It can therefore be concluded that the magnitude of the impact is of negligible concern. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for breeding birds. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Meadow pipit (Medium)	During the route selection process, hydrogeologically sensitive areas were avoided where practicable (Chapter 3: Consideration of Reasonable Alternatives). However, during the Operational Phase along the 20m wide Permanent Wayleave the presence of the subsurface Treated Water Pipeline could impact the existing hydrological regime resulting in a potential reduction or loss of water-dependent habitats such as wet grasslands and peatlands used by breeding meadow pipit. In order to eliminate the potential for drainage of water-dependent habitats, standard construction methods and pipeline designs would be implemented to prevent groundwater flow along the pipeline (Chapter 5: Construction & Commissioning). With these design measures in place, it is predicted, hydrological impacts on soils, subsoils or bedrock during the Operational Phase of the Proposed Project (Chapter 10: Soils, Geology and Hydrogeology), would not result in a likely significant negative effect on the availability of suitable habitat for breeding waders, at any geographic scale. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for breeding birds. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Mute swan (High)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. The results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effect. It can therefore be concluded that the magnitude of the impact is of negligible concern. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for breeding birds. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Permanent, Not Significant negative effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Peregrine falcon (Medium)	The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for breeding birds. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Ringed plover (Low)	During the route selection process, hydrogeologically sensitive areas were avoided where practicable (Chapter 3: Consideration of Reasonable Alternatives). However, during the Operational Phase along the 20m wide Permanent Wayleave the presence of the subsurface Treated Water Pipeline could impact the existing hydrological regime resulting in a potential reduction or loss of water-dependent habitats such as wet grasslands and peatlands used by breeding waders. In order to eliminate the potential for drainage of water-dependent habitats, standard construction methods and pipeline designs would be implemented to prevent groundwater flow along the pipeline (Chapter 5: Construction & Commissioning). With these design measures in place, it is predicted, hydrological impacts on soils, subsoils or bedrock during the Operational Phase of the Proposed Project (Chapter 10: Soils, Geology and Hydrogeology), would not result in a likely significant negative effect on the availability of suitable habitat for breeding waders, at any geographic scale. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for breeding birds. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Sand martin (Low)	The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for breeding birds. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Snipe (Medium)	During the route selection process, hydrogeologically sensitive areas were avoided where practicable (Chapter 3: Consideration of Reasonable Alternatives). However, during the Operational Phase along the 20m wide Permanent Wayleave the presence of the subsurface Treated Water Pipeline could impact the existing hydrological regime resulting in a potential reduction or loss of water-dependent habitats such as wet grasslands and peatlands used by breeding waders. In order to eliminate the potential for drainage of water-dependent habitats, standard construction methods and pipeline designs would be implemented to prevent groundwater flow along the pipeline (Chapter 5: Construction & Commissioning). With these design measures in place, it is predicted, hydrological impacts on soils, subsoils or bedrock during the Operational Phase of the Proposed Project (Chapter 10: Soils, Geology and Hydrogeology), would not result in a likely significant negative effect on the availability of suitable habitat for breeding waders, at any geographic scale. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for breeding birds. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Woodcock (Medium)	During the route selection process, hydrogeologically sensitive areas were avoided where practicable (Chapter 3: Consideration of Reasonable Alternatives). However, during the Operational Phase along the 20m wide Permanent Wayleave the presence of the subsurface Treated Water Pipeline could impact the existing hydrological regime resulting in a potential reduction or loss of water-dependent habitats such as wet grasslands and peatlands used by breeding waders. In order to eliminate the potential for drainage of water-dependent habitats, standard construction methods and pipeline designs would be implemented to prevent groundwater flow along the pipeline (Chapter 5: Construction & Commissioning). With these design measures in place, it is predicted, hydrological impacts on soils, subsoils or bedrock during the Operational Phase of the Proposed Project (Chapter 10: Soils, Geology and Hydrogeology), would not result in a likely significant negative effect on the availability of suitable habitat for breeding waders, at any geographic scale. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for breeding birds. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Yellowhammer (Medium)	The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for breeding birds. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Other Species of Low Conservation Significance (as listed in Table 8.44) (Medium to Very Low)	The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for breeding birds. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Medium to Very Low Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects

Note: * Percival Significance Evaluation is calculated as a product of the sensitivity (Table 8.19) of the species and the magnitude (Table 8.20) of the effect.

8.7.4.1.2 *Disturbance/Displacement*

914. Once construction is complete and the Proposed Project is operational, works would be limited to routine regular inspections of the infrastructure sites, 20m wide Permanent Wayleave and valves, and general repair and maintenance. The level of operational activity is expected to be temporary and sufficiently low to avoid any significant disturbance impacts on birds that use the Proposed Project, thus there are no likely significant negative effects, at any geographic scale.

8.7.4.1.3 *Collision Risk*

915. 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 (EirGrid 2016).
916. Based on the long-term existence of the transmission lines associated 38 kV Uprate Works at its current location, the limited evidence of recorded collisions available online and from other sources, and the absence of collisions observed over the course of the survey period (April 2019 to March 2023 inclusive), the potential direct negative effects on breeding bird species from collisions is likely to be negligible to low in the long-term.
917. Table 8.88 assesses the potential risk of collision on KER avian ecological receptor species observed within the study area. The vulnerability of bird species to collision with electricity transmission lines was assessed using EirGrid's Ecology Guidelines for Electricity Transmission Projects (EirGrid 2020).
918. There is potential for collision risks to occur with the proposed solar panels which are to be installed at the WTP, BPT, BPS, FCV, and TPR. These panels would either be mounted on the proposed buildings, ground mounted, or both (more details can be found in Chapter 4: Proposed Project Description). However, the impact on birds is expected to be minimal. The areas where the panels would be installed are relatively small (1.6ha of ground mounted panels at the WTP, 0.05ha of ground mounted panels at the BPT, 0.03ha of ground mounted panels at the BPS, and 0.06ha of ground mounted panels at the FCV, while at the TPR only panels on roofs are proposed), significantly reducing the likelihood of large-scale bird interactions. Additionally, breeding bird surveys at these locations recorded limited bird activity, suggesting that these sites do not serve as important foraging grounds, nesting areas, or migratory pathways. Given these considerations, the proposed installation of these solar panels is unlikely to give rise to collision risks that would affect the conservation status of breeding birds, and thus there are no likely significant negative effects, at any geographical scale.

Table 8.88: Assessing the Pre-Mitigation Risk of Collision with the Proposed 38 kV Uprate Works for Breeding Birds

Species (Collision Sensitivity)	Survey Results	Collision Risk (Magnitude)	Significance Evaluation*
Coot (High)	Coots were regularly observed during VP surveys as they foraged at O'Briensbridge. No flights were recorded. One or two individuals were observed foraging on the water within the viewshed area.	These bird species are considered to be the most vulnerable to electricity transmission lines due to their relative body size, flight height or poor flight manoeuvrability. They generally have a high risk of collision or electrocution and are vulnerable due to using flight lines on migration routes, travelling between moulting and roosting sites, or to and from breeding grounds. Potential long-term direct negative effects on wintering bird species from collisions are likely to be negligible to low, based on the long-term existence of the line at its current location and with limited evidence of known records of collisions to date. Fitting bird flight diverters across the Lower River Shannon SAC and the Headrace between polesets 64B to 67B would further reduce the likelihood of avian collisions.	Sensitivity: High Magnitude: Low Significance: Slight Permanent, Slight negative effects
Cormorant (High)	Cormorants were frequently recorded during VP surveys at O'Briensbridge. The majority of these flights were of birds commuting towards Parteen Basin or in the direction of the Shannon Estuary without landing in the study area. Given the regular observations of commuting flights within the study area, it is considered likely that the local population use both Parteen Basin and the Shannon Estuary for feeding and roosting.		Sensitivity: High Magnitude: Low Significance: Slight Permanent, Slight negative effects
Greylag goose (High)	Greylag goose was recorded during the VP surveys. Small flocks were recorded foraging to the south-east of the VP near the southern line of the proposed 38 kV Uprate Works. Commuting individuals were also recorded along the River Shannon.		Sensitivity: High Magnitude: Low Significance: Slight Permanent, Slight negative effects
Little grebe (High)	This species was recorded at O'Briensbridge during the 2019 to 2024 breeding surveys. This species was most often recorded on open water and in fringing habitat on the western shore. The species was also recorded during the I-WeBS at McNamara's Lake. Little grebe was not recorded flying at collision height or in the ZoI of the lines.		Sensitivity: High Magnitude: Low Significance: Slight Permanent, Slight negative effects
Mallard (High)	Mallard was frequently recorded during VP surveys at O'Briensbridge during the breeding bird seasons between 2019 and 2024. The majority of these flights were of birds commuting towards Parteen Basin or in the direction of the Shannon Estuary, with only a few records landing in the study area to feed and roost.		Sensitivity: High Magnitude: Low Significance: Slight Permanent, Slight negative effects
Mute swan (High)	Mute swan were frequently encountered during VP surveys at O'Briensbridge. The number of individuals observed per flight was low (typically involving two individuals). Most of the observations were of loafing individuals on site. Breeding was confirmed at O'Briensbridge.		Sensitivity: High Magnitude: Low Significance: Slight Permanent, Slight negative effects

Species (Collision Sensitivity)	Survey Results	Collision Risk (Magnitude)	Significance Evaluation*
Lapwing (Medium)	Lapwing were only recorded on one occasion during the summer months, and no evidence of breeding was observed. They regularly forage along wetland habitats.	These species are evaluated as having a moderate susceptibility to collision with powerlines based on their relative body size, flight height or flight manoeuvrability. Potential long-term direct negative effects on breeding bird species from collisions is likely to be negligible to low, based on the long-term existence of the line at its current location and with a lack of evidence of known records of collisions to date. Fitting bird flight diverters across the Lower River Shannon SAC and the Headrace between polesets 64B to 67B, would further reduce the likelihood of avian collisions.	Sensitivity: Medium Magnitude: Low Significance: Slight Permanent, Slight negative effects
Curlew (Medium)	Curlew were recorded rarely during the breeding bird surveys, usually in small numbers at the beginning and end of the breeding bird seasons. These are likely birds on migration to breeding or wintering sites, away from the Proposed Project. There was no evidence of breeding curlew over the survey period.		Sensitivity: Medium Magnitude: Low Significance: Slight Permanent, Slight negative effects
Redshank (Medium)	Redshank were recorded rarely during the breeding bird surveys, usually in small numbers at the beginning and end of the breeding bird seasons. These are likely birds on migration to breeding or wintering sites, away from the Proposed Project. There was no evidence of breeding redshank over the survey period. During the 2020/21 winter survey period redshank was frequently recorded as it foraged along the edge of the Headrace. They were not observed flying within the study area of the 38 kV Uprate Works.		Sensitivity: Medium Magnitude: Low Significance: Slight Permanent, Slight negative effects
Snipe (Medium)	Snipe were recorded on two separate occasions during the 2019 Breeding Bird Walkover Surveys for lowland waders. These individuals were both recorded in May and were not considered to be breeding, as they were not recorded in subsequent months. These individuals were both found in wet grassland habitats.		Sensitivity: Medium Magnitude: Low Significance: Slight Permanent, Slight negative effects
Black-headed gull (Low)	Black-headed gulls were frequently recorded during VP surveys at O'Briensbridge. The vast majority of VP surveys recorded foraging black-headed gull flying throughout the viewshed. Individuals were also regularly observed commuting along the Lower River Shannon.		Sensitivity: Low Magnitude: Low Significance: Not Significant Permanent, Not Significant negative effects
Common gull (Low)	This species was recorded on one occasion during the 2020 breeding season commuting along the lower River Shannon.		Sensitivity: Low Magnitude: Low Significance: Not Significant Permanent, Not Significant negative effects

Species (Collision Sensitivity)	Survey Results	Collision Risk (Magnitude)	Significance Evaluation*
Herring gull (Low)	Herring gull were infrequently observed during VP surveys at O'Briensbridge, at polesets 66B to 67B. The vast majority of VP surveys recorded commuting herring gull flying throughout the viewshed. The majority of these flights were of birds commuting towards Parteen Basin or in the direction of the Shannon Estuary without landing in the study area.	These species are evaluated as having a moderate susceptibility to collision with powerlines based on their relative body size, flight height or flight manoeuvrability. Potential long-term direct negative effects on breeding bird species from collisions is likely to be negligible to low, based on the long-term existence of the line at its current location and with a lack of evidence of known records of collisions to date. Fitting bird flight diverters across the Lower River Shannon SAC and the Headrace between polesets 64B to 67B, would further reduce the likelihood of avian collisions.	Sensitivity: Low Magnitude: Low Significance: Not Significant Permanent, Not Significant negative effects
Kestrel (Low)	Kestrel were frequently observed during VP surveys at O'Briensbridge, at polesets 66B to 67B. The majority of VP surveys recorded commuting or hunting kestrel flying throughout the viewshed.		Sensitivity: Low Magnitude: Low Significance: Not Significant Permanent, Not Significant negative effects
Kingfisher (Low)	Kingfisher was observed at O'Briensbridge on two separate occasions as it commuted across the River Shannon. This species is typically confined to the margins of water bodies, where it finds both feeding and roosting opportunities.		Sensitivity: Low Magnitude: Low Significance: Not Significant Permanent, Slight negative effects
Lesser black-backed gull (Low)	Lesser black-backed gull were frequently observed during VP surveys at O'Briensbridge, at polesets 66B to 67B. The majority of these flights were of birds commuting towards Parteen Basin or in the direction of the Shannon Estuary without landing in the study area.		Sensitivity: Low Magnitude: Low Significance: Not Significant Permanent, Slight negative effects
Sand Martin (Low)	This species was regularly recorded foraging along the water during VP surveys at O'Briensbridge.		Sensitivity: Low Magnitude: Low Significance: Not Significant Permanent, Not Significant negative effects
Sparrowhawk (Low)	This species was recorded on two separate occasions as it hunted along the treelines beside the VP at O'Briensbridge. No evidence of breeding was observed.		Sensitivity: Low Magnitude: Low Significance: Not Significant Permanent, Not Significant negative effects
Other Species of Low Conservation Significance (as listed in Table 8.46) (Low)	These species were determined to be less at risk from potential impacts associated with the Proposed Project, as they have a more favourable conservation status, were rarely recorded during surveys, or are not thought to be dependent on the area for breeding or feeding.		Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects

Note: * Percival Significance Evaluation is calculated as a product of the sensitivity (based on a species collision risk) of the species and the magnitude (Table 8.20) of the effect.

8.7.4.2 Breeding Birds – Summary of Effects During the Operational Phase

919. Table 8.89 summarises the potential Operational Phase impacts on breeding birds. There would be no likely significant effects.

Table 8.89: Summary of Pre-Mitigation Effects Upon Breeding Birds During the Operational Phase of the Proposed Project

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Potential significant Effect
Barn owl	Red Listed (BoCCI)	Ballyhugh or Springfield and Cangort, County Offaly, Ballyanny, County Tipperary	- Habitat loss and fragmentation - Disturbance/displacement - Collision risk	The completion of the construction of the Proposed Project would result in the permanent loss of a nest site for this species, as this nest site was located within a mature beech tree located within the boundary of the Proposed Project, which will not be the subject of replanting due to its location over the proposed pipeline, this nest site will be permanently lost.	Yes
Black-headed gull	Amber Listed (BoCCI)	Goat Island (Lough Derg), County Tipperary, Parteen Basin and Lough Ourna, County Tipperary, Island, County Offaly		Potential impacts associated with the Proposed Project on suitable breeding bird habitats along the Treated Water Pipeline would be temporary. Habitats would be restored to pre-existing ground conditions. It is expected that breeding bird species would reoccupy disturbed habitat during the Operational Phase, following reinstatement. Therefore, there would be no likely significant effect during the Operational Phase.	No
Coot	Amber Listed (BoCCI)	Lough Derg, including Slevoir Bay and Lough Ourna, County Tipperary		Suitable breeding bird habitats would be permanently lost as a result of the construction of the RWI&PS, WTP, BPT, BPS, FCV and TPR. However, at these infrastructure sites limited breeding bird activity was recorded. Given that there are extensive areas of suitable breeding habitat available adjacent to these sites and in the wider surrounding landscape, impacts associated with loss of habitat would result in imperceptible to slight, permanent negative effects at a local geographic scale.	No
Cormorant	Amber Listed (BoCCI)	38 kV site, Lough Derg and Parteen Basin, County Tipperary		An increased human presence at the RWI&PS, WTP, BPT, BPS, FCV and TPR during the Operational Phase may cause disturbance to breeding birds. However, the level of operational activity is expected to be sufficiently low to avoid any disturbance impacts on breeding birds that use the Proposed Project. It is considered that these impacts would be temporary and would not result in a likely significant effect.	No
Curlew	Red Listed (BoCCI)	Parteen Basin, Boolagelagh North Tipperary, Loughourna North Tipperary, Derryarroe, Lullybeg and Castledillon Upper County Kildare		Following the completion of the 38 kV Uprate Works, a permanent power cable would be in place during the Operational Phase. This may pose a collision risk with breeding birds. However, as there are already existing powerlines in place and no collisions were recorded over the entirety of the survey period, impacts associated with collision risk are predicted to be negligible to low in the long-term.	No
Great crested grebe	Amber Listed (BoCCI)	Parteen Basin and Lough Ourna, County Tipperary			No
Hen harrier	Annex I EC Birds Directive	None identified within the study area but were recorded in nearby locations including Shinrone, Kinnitty and Mount Lucas Bog, County Offaly			No
Kestrel	Red Listed (BoCCI)	Lough Derg, Parteen Basin, Carrigatogher, Boolagelagh, Ballyannymore and Ballyanny, County Tipperary, Lullybeg and Derrycreeb, County Kildare			No

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Potential significant Effect
Lapwing	Red Listed (BoCCI)	Lough Derg, Ardcroney, Parteen Basin, Gortmore, Incha Beg, Gortmore and Carrigatogher, County Tipperary, Drehid Pools, Cloona, Lullymore, Edenderry, Lullybeg and Ticknevin, County Kildare, Kilmurryely, Ballycon, Rathlumber and Cloona, County Offaly	- Habitat loss and fragmentation - Disturbance/displacement - Collision risk	- Potential impacts associated with the Proposed Project on suitable breeding bird habitats along the Treated Water Pipeline would be temporary. Habitats would be restored to pre-existing ground conditions. It is expected that breeding bird species would reoccupy disturbed habitat during the Operational Phase, following reinstatement. Therefore, there would be no likely significant effect during the Operational Phase. - Suitable breeding bird habitats would be permanently lost as a result of the construction of the RWI&PS, WTP, BPT, BPS, FCV and TPR. However, at these infrastructure sites limited breeding bird activity was recorded. Given that there are extensive areas of suitable breeding habitat available adjacent to these sites and in the wider surrounding landscape, impacts associated with loss of habitat would result in imperceptible to slight, permanent negative effects at a local geographic scale. - An increased human presence at the RWI&PS, WTP, BPT, BPS, FCV and TPR during the Operational Phase may cause disturbance to breeding birds. However, the level of operational activity is expected to be sufficiently low to avoid any disturbance impacts on breeding birds that use the Proposed Project. It is considered that these impacts would be temporary and would not result in a likely significant effect. - Following the completion of the 38 kV Uprate Works, a permanent power cable would be in place during the Operational Phase. This may pose a collision risk with breeding birds. However, as there are already existing powerlines in place and no collisions were recorded over the entirety of the survey period, impacts associated with collision risk are predicted to be negligible to low in the long-term.	No
Meadow pipit	Red Listed (BoCCI)	Peatland habitats and wet grassland in Counties Tipperary, Offaly and Kildare			No
Mute swan	Amber Listed (BoCCI)	Lough Derg, Parteen Basin and Lough Ourna, County Tipperary			No
Peregrine falcon	Annex I EC Birds Directive	Ballyanny Lower, County Tipperary, Lullymore, County Offaly, Newtown, County Kildare			No
Redshank	Red Listed (BoCCI)	O'Briensbridge, County Clare, Parteen Basin, County Tipperary			No
Ringed plover	Amber Listed (BoCCI)	Island, Esker Beg and Rathlumber, County Offaly, Derryvarroge, County Kildare			No
Sand martin	Amber Listed (BoCCI)	Common throughout the Proposed Project			No
Snipe	Red Listed (BoCCI)	Common throughout the Proposed Project			No
Woodcock	Red Listed (BoCCI)	Drehid, Timahoe East and Derrycrib, County Kildare			No
Yellowhammer	Red Listed (BoCCI)	Throughout the Proposed Project			No
Other Species of Low Conservation Significance (as listed in Table 8.44 and Table 8.48)	Red, Amber and Green Listed (BoCCI)	Throughout the Proposed Project			No

8.7.5 Ornithology – Wintering Birds

8.7.5.1 Key Species of Conservation Significance

920. Potential impacts on breeding avian communities during the Operational Phase, within the study area of the Proposed Project, have been divided into three main types: habitat loss and fragmentation (Section 8.7.4.1.1), disturbance/displacement (Section 8.7.4.1.2), and collision risk (Section 8.7.4.1.3). The operational strategy for the Proposed Project is described in detail in Appendix A4.1 (Operational Strategy).

8.7.5.1.1 *Habitat Loss and Fragmentation*

921. Table 8.90 assesses the potential effect of habitat loss and fragmentation, in the absence of mitigation, on KER avian species observed within the Proposed Project. The methodology of assessment of the effects of habitat loss and fragmentation is in accordance with Percival (2003) (Section 8.2.7.4). The magnitude of this impact is determined based on the proportion of habitat which would be lost, relative to the availability of habitats which are used by KER avian species both on-site and within the wider surroundings.

922. Following completion of the proposed 38 kV Uprate Works, cutting and trimming of trees and vegetation is required to ensure that the minimum corridor widths are maintained throughout the life of the operational powerline, which is currently the case. Such activities are unlikely to affect conservation status of any wintering bird species, and thus there are no likely significant negative effects, at any geographic scale.

Table 8.90: Assessing the Pre-Mitigation Effect of Habitat Loss and Fragmentation on Key Ecological Receptor Avian Species due to Operational Phase Activities

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Black-headed gull (High)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. As mentioned (Section 8.7.3.1), the results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effects (Chapter 9: Water). It can therefore be concluded that the magnitude of the impact is of negligible concern. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for wintering birds. Loss of foraging habitat at these sites during the Operational Phase would be permanent. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Permanent, Not Significant negative effects
Coot (High)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. As mentioned (Section 8.7.3.1), the results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effects (Chapter 9: Water). It can therefore be concluded that the magnitude of the impact is of negligible concern. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for wintering birds. Loss of foraging habitat at these sites during the Operational Phase would be permanent. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Permanent, Not Significant negative effects
Cormorant (Very high)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. As mentioned (Section 8.7.3.1), the results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effects (Chapter 9: Water). It can therefore be concluded that the magnitude of the impact is of negligible concern.	Sensitivity: Very High Magnitude: Negligible Significance: Slight Permanent, Slight negative effects
Curlew (High)	During the route selection process, hydrogeologically sensitive areas were avoided where practicable (Chapter 3: Consideration of Reasonable Alternatives). However, during the Operational Phase along the 20m wide Permanent Wayleave the presence of the subsurface Treated Water Pipeline could impact the existing hydrological regime resulting in a potential reduction or loss of water-dependent habitats such as wet grasslands and peatlands used by breeding waders. In order to eliminate the potential for drainage of water-dependent habitats, standard construction methods and pipeline designs would be implemented to prevent groundwater flow along the pipeline (Chapter 5: Construction & Commissioning). With these design measures in place, it is predicted, hydrological impacts on soils, subsoils or bedrock during the Operational Phase of the Proposed Project (Chapter 10: Soils, Geology and Hydrogeology), would not result in a likely significant negative effect on the availability of suitable habitat for breeding waders, at any geographic scale. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for wintering birds. Loss of foraging habitat at these sites during the Operational Phase would be permanent. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Permanent, Not Significant negative effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Gadwall (Low)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. As mentioned (Section 8.7.3.1), the results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effects (Chapter 9: Water). It can therefore be concluded that the magnitude of the impact is of negligible concern.	Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Golden plover (Medium)	During the route selection process, hydrogeologically sensitive areas were avoided where practicable (Chapter 3: Consideration of Reasonable Alternatives). However, during the Operational Phase along the 20m wide Permanent Wayleave the presence of the subsurface Treated Water Pipeline could impact the existing hydrological regime resulting in a potential reduction or loss of water-dependent habitats such as wet grasslands and peatlands used by breeding waders. In order to eliminate the potential for drainage of water-dependent habitats, standard construction methods and pipeline designs would be implemented to prevent groundwater flow along the pipeline (Chapter 5: Construction & Commissioning). With these design measures in place, it is predicted, hydrological impacts on soils, subsoils or bedrock during the Operational Phase of the Proposed Project (Chapter 10: Soils, Geology and Hydrogeology), would not result in a likely significant negative effect on the availability of suitable habitat for breeding waders, at any geographic scale. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for wintering birds. Loss of foraging habitat at these sites during the Operational Phase would be permanent. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Goldeneye (Very high)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. As mentioned (Section 8.7.3.1), the results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effects (Chapter 9: Water). It can therefore be concluded that the magnitude of the impact is of negligible concern.	Sensitivity: Very High Magnitude: Negligible Significance: Slight Permanent, Slight negative effects
Great crested grebe (High)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. As mentioned (Section 8.7.3.1), the results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effects (Chapter 9: Water). It can therefore be concluded that the magnitude of the impact is of negligible concern. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for wintering birds. Loss of foraging habitat at these sites during the Operational Phase would be permanent. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Permanent, Not Significant negative effects
Hen harrier (High)	The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for wintering birds. Loss of foraging habitat at these sites during the Operational Phase would be permanent. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: High Magnitude: Negligible Significance: Not Significant Permanent, Not Significant negative effects
Herring gull (Low)	The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for wintering birds. Loss of foraging habitat at these sites during the Operational Phase would be permanent. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Lapwing (Medium)	During the route selection process, hydrogeologically sensitive areas were avoided where practicable (Chapter 3: Consideration of Reasonable Alternatives). However, during the Operational Phase along the 20m wide Permanent Wayleave the presence of the subsurface Treated Water Pipeline could impact the existing hydrological regime resulting in a potential reduction or loss of water-dependent habitats such as wet grasslands and peatlands used by breeding waders. In order to eliminate the potential for drainage of water-dependent habitats, standard construction methods and pipeline designs would be implemented to prevent groundwater flow along the pipeline (Chapter 5: Construction & Commissioning). With these design measures in place, it is predicted, hydrological impacts on soils, subsoils or bedrock during the Operational Phase of the Proposed Project (Chapter 10: Soils, Geology and Hydrogeology), would not result in a likely significant negative effect on the availability of suitable habitat for breeding waders, at any geographic scale. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for wintering birds. Loss of foraging habitat at these sites during the Operational Phase would be permanent. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Lesser black-backed gull (Low)	The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for wintering birds. Loss of foraging habitat at these sites during the Operational Phase would be permanent. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Mallard (Low)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. As mentioned (Section 8.7.3.1), the results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effects (Chapter 9: Water). It can therefore be concluded that the magnitude of the impact is of negligible concern. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for wintering birds. Loss of foraging habitat at these sites during the Operational Phase would be permanent. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Mute swan (Very high)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. As mentioned (Section 8.7.3.1), the results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effects (Chapter 9: Water). It can therefore be concluded that the magnitude of the impact is of negligible concern. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for wintering birds. Loss of foraging habitat at these sites during the Operational Phase would be permanent. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Very high Magnitude: Negligible Significance: Slight Permanent, Slight negative effects
Pochard (Medium)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. As mentioned (Section 8.7.3.1), the results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effects (Chapter 9: Water). It can therefore be concluded that the magnitude of the impact is of negligible concern.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Redshank (Medium)	During the route selection process, hydrogeologically sensitive areas were avoided where practicable (Chapter 3: Consideration of Reasonable Alternatives). However, during the Operational Phase along the 20m wide Permanent Wayleave the presence of the subsurface Treated Water Pipeline could impact the existing hydrological regime resulting in a potential reduction or loss of water-dependent habitats such as wet grasslands and peatlands used by breeding waders. In order to eliminate the potential for drainage of water-dependent habitats, standard construction methods and pipeline designs would be implemented to prevent groundwater flow along the pipeline (Chapter 5: Construction & Commissioning). With these design measures in place, it is predicted, hydrological impacts on soils, subsoils or bedrock during the Operational Phase of the Proposed Project (Chapter 10: Soils, Geology and Hydrogeology), would not result in a likely significant negative effect on the availability of suitable habitat for breeding waders, at any geographic scale. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for wintering birds. Loss of foraging habitat at these sites during the Operational Phase would be permanent. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Shoveler (Medium)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. As mentioned (Section 8.7.3.1), the results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effects (Chapter 9: Water). It can therefore be concluded that the magnitude of the impact is of negligible concern.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Snipe (Medium)	During the route selection process, hydrogeologically sensitive areas were avoided where practicable (Chapter 3: Consideration of Reasonable Alternatives). However, during the Operational Phase along the 20m wide Permanent Wayleave the presence of the subsurface Treated Water Pipeline could impact the existing hydrological regime resulting in a potential reduction or loss of water-dependent habitats such as wet grasslands and peatlands used by breeding waders. In order to eliminate the potential for drainage of water-dependent habitats, standard construction methods and pipeline designs would be implemented to prevent groundwater flow along the pipeline (Chapter 5: Construction & Commissioning). With these design measures in place, it is predicted, hydrological impacts on soils, subsoils or bedrock during the Operational Phase of the Proposed Project (Chapter 10: Soils, Geology and Hydrogeology), would not result in a likely significant negative effect on the availability of suitable habitat for breeding waders, at any geographic scale. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for wintering birds. Loss of foraging habitat at these sites during the Operational Phase would be permanent. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Teal (Low)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. As mentioned (Section 8.7.3.1), the results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effects (Chapter 9: Water). It can therefore be concluded that the magnitude of the impact is of negligible concern.	Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Tufted duck (Very high)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. As mentioned (Section 8.7.3.1), the results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effects (Chapter 9: Water). It can therefore be concluded that the magnitude of the impact is of negligible concern.	Sensitivity: Very high Magnitude: Negligible Significance: Slight Permanent, Slight negative effects

Key Ecological Receptor (Sensitivity)	Habitat Loss and Fragmentation (Magnitude)	Significance Evaluation*
Whooper swan (Medium)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. As mentioned (Section 8.7.3.1), the results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effects (Chapter 9: Water). It can therefore be concluded that the magnitude of the impact is of negligible concern. The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for wintering birds. Loss of foraging habitat at these sites during the Operational Phase would be permanent. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant.	Sensitivity: Medium Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Wigeon (Low)	A reduction in water level due to water abstraction could result in an alteration of the distribution and abundance of suitable foraging habitats for water birds. As mentioned (Section 8.7.3.1), the results of the hydrological model analysis indicate there would be a negligible magnitude of impact on the levels of water in Lough Derg and Parteen Basin which would result in no likely significant effects (Chapter 9: Water). It can therefore be concluded that the magnitude of the impact is of negligible concern.	Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects
Other Species of Low Conservation Significance (as listed in Section Table 8.48 and Table 8.50) (Medium to Very Low)	The construction and operation of the RWI&PS, WTP, BPT, BPS, FCV, TPR, access roads, and 20m wide Permanent Wayleave would result in a permanent loss of potential foraging habitat for breeding birds. However, given that there are extensive areas of suitable foraging habitat available adjacent to the sites and in the wider landscape, impacts associated with loss of foraging habitat are considered not significant. It can therefore be concluded that the magnitude of the impact is of negligible concern.	Sensitivity: Medium to Very Low Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects

Note: * Percival Significance Evaluation is calculated as a product of the sensitivity (Table 8.19) of the species and the magnitude (Table 8.20) of the effect.

8.7.5.1.2 *Disturbance/Displacement*

923. Once construction is complete and the Proposed Project is operational, works would be limited to routine regular inspections of the 20m wide Permanent Wayleave and valves, and general repair and maintenance. The level of operational activity is expected to be sufficiently low to avoid any significant disturbance impacts on birds that use the Proposed Project. It is considered that these impacts would be temporary and would not result in a likely significant effect.

8.7.5.1.3 *Collision Risk*

924. 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 (EirGrid 2016).
925. Based on the long-term existence of the transmission line associated with the 38 kV Uprate Works at its current location, with no known records of collisions to date, potential direct negative effects on wintering bird species from collisions is likely to be negligible to low in the long-term.
926. Table 8.91 assesses the potential risk of collision on KER avian ecological receptor species observed within the study area. The vulnerability of bird species to collision with electricity transmission lines was assessed using EirGrid's Ecology Guidelines for Electricity Transmission Projects (EirGrid 2020).
927. There is potential for collision risks to occur with the proposed solar panels which are to be installed at the WTP, BPT, BPS, FCV, and TPR. These panels would either be mounted on the proposed buildings, ground mounted, or both (more details can be found in Chapter 4: Proposed Project Description). However, the impact on birds is expected to be minimal. The areas where the panels would be installed are relatively small (1.6ha of ground mounted panels at the WTP, 0.05ha of ground mounted panels at the BPT, 0.03ha of ground mounted panels at the BPS, and 0.06ha of ground mounted panels at the FCV, while at the TPR only panels on roofs are proposed), significantly reducing the likelihood of large-scale bird interactions. Additionally, wintering bird surveys at these locations recorded limited bird activity, suggesting that these sites do not serve as important foraging grounds or migratory pathways. Given these considerations, the proposed installation of these solar panels is unlikely to give rise to collision risks that would affect the conservation status of wintering birds, and thus there are no likely significant negative effects, at any geographical scale.

Table 8.91: Assessing the Pre-Mitigation Risk of Collision with the Proposed 38 kV Uprate Works for Wintering Birds

Species (Collision Sensitivity)	Survey Results	Collision Risk (Magnitude)	Significance Evaluation*
Cormorant (High)	Cormorants were recorded regularly as they were commuting along the Lower River Shannon, Headrace and across Parteen Basin. They were also recorded on a few occasions as they foraged in these areas. They are considered at high risk of collision with the 38 kV Uprate Works.	These bird species are considered to be the most vulnerable to electricity transmission lines due to their relative body size, flight height or poor flight manoeuvrability. They generally have a high risk of collision or electrocution and are vulnerable due to using flight lines on migration routes, travelling between moulting and breeding ground, or to and from breeding grounds. Potential long-term direct negative effects on wintering bird species from collisions are likely to be negligible to low, based on the long-term existence of the line at its current location and with limited evidence of known records of collisions to date. Fitting bird flight diverters across the Lower River Shannon SAC and the Headrace between polesets 64B to 67B, would further reduce the likelihood of avian collisions.	Sensitivity: High Magnitude: Low Significance: Slight Permanent, Slight negative effects
Greylag goose (High)	Greylag goose is a species at high risk of collision with OHLs. It was recorded frequently throughout the study area with commuting flights along the Lower River Shannon, Headrace and to Parteen Basin. The species was often found feeding and roosting in the fields directly south-east of Parteen weir.		Sensitivity: High Magnitude: Low Significance: Slight Permanent, Slight negative effects
Little grebe (High)	During the winter survey period little grebe was not recorded flying at collision height or within the study area of the 38 kV Uprate Works. This species spends most of its time near the shoreline.		Sensitivity: High Magnitude: Low Significance: Slight Permanent, Slight negative effects
Mute swan (High)	Mute swan was recorded frequently throughout the study area with commuting flights along the Lower River Shannon, Headrace and Parteen Basin. It was recorded flying at collision height on one occasion in 2019 as it commuted along the Lower River Shannon.		Sensitivity: High Magnitude: Low Significance: Slight Permanent, Slight negative effects
Tufted duck (High)	During the winter survey period tufted duck were infrequently recorded flying and not observed near the 38 kV Uprate Works.		Sensitivity: High Magnitude: Low Significance: Slight Permanent, Slight negative effects

Species (Collision Sensitivity)	Survey Results	Collision Risk (Magnitude)	Significance Evaluation*
Curlew (Medium)	During the winter survey period curlew were infrequently recorded flying and not observed near the 38 kV Uprate Works.		Sensitivity: Medium Magnitude: Low Significance: Slight Permanent, Slight negative effects
Lapwing (Medium)	Lapwing is a species at medium risk of collision with OHLs. It was recorded frequently throughout the study area, with commuting flights along the Lower River Shannon, Headrace and Parteen Basin. The species was often recorded resting along the banks of the Headrace, typically in flocks which ranged in numbers from two to 85.	These species are evaluated as having a moderate susceptibility to collision with powerlines based on their relative body size, flight height or flight manoeuvrability. Potential long-term direct negative effects on wintering bird species from collisions are likely to be negligible to low, based on the long-term existence of the line at its current location and with limited evidence of known records of collisions to date. Fitting bird flight diverters across the Lower River Shannon SAC and the Headrace between polesets 64B to 67B, would further reduce the likelihood of avian collisions.	Sensitivity: Medium Magnitude: Low Significance: Slight Permanent, Slight negative effects
Redshank (Medium)	During the 2020/21 winter survey period redshank were frequently recorded as it foraged along the edge of the Headrace. They were not observed flying within the study area of the 38 kV Uprate Works.		Sensitivity: Medium Magnitude: Low Significance: Slight Permanent, Slight negative effects
Snipe (Medium)	During the winter survey period snipe were infrequently recorded flying and not observed near the 38 kV Uprate Works.		Sensitivity: Medium Magnitude: Low Significance: Slight Permanent, Slight negative effects
Black-headed gull (Low)	During the winter survey period black-headed gull were regularly observed commuting through the study area. The species was recorded commuting over the Lower River Shannon, Headrace and Parteen Basin.	These species are evaluated as having a low susceptibility to collision with powerlines based on their relative body size, flight height or flight manoeuvrability. Potential long-term direct negative effects on wintering bird species from collisions are likely to be negligible to low, based on the long-term existence of the line at its current location and with limited evidence of known records of collisions to date. Fitting bird flight diverters across the Lower River Shannon SAC and the Headrace between polesets 64B to 67B, would further reduce the likelihood of avian collisions.	Sensitivity: Low Magnitude: Low Significance: Not Significant Permanent, Not Significant negative effects

Species (Collision Sensitivity)	Survey Results	Collision Risk (Magnitude)	Significance Evaluation*
Herring Gull (Low)	During the winter survey period herring gull were infrequently recorded (two occasions) as they commuted along the Lower River Shannon.	These species are evaluated as having a low susceptibility to collision with powerlines based on their relative body size, flight height or flight manoeuvrability. Potential long-term direct negative effects on wintering bird species from collisions are likely to be negligible to low, based on the long-term existence of the line at its current location and with limited evidence of known records of collisions to date. Fitting bird flight diverters across the Lower River Shannon SAC and the Headrace between polesets 64B to 67B, would further reduce the likelihood of avian collisions.	Sensitivity: Low Magnitude: Low Significance: Not Significant Permanent, Not Significant negative effects
Kestrel (Low)	This species was recorded regularly as it hunted along the edge of the River Shannon, often using the OHL poles as resting or hunting perches.		Sensitivity: Low Magnitude: Low Significance: Not Significant Permanent, Not Significant negative effects
Kingfisher (Low)	During the winter survey period kingfisher were recorded on several occasions as it commuted and hunted along the Lower River Shannon, Headrace and Parteen Basin.		Sensitivity: Low Magnitude: Low Significance: Not Significant Permanent, Not Significant negative effects
Lesser black-backed gull (Low)	During the winter survey period lesser black-backed gull were occasional recorded commuting along the Lower River Shannon.		Sensitivity: Low Magnitude: Low Significance: Not Significant Permanent, Not Significant negative effects
Sparrowhawk (Low)	During the winter survey period sparrowhawk were recorded hunting on four occasions throughout the study area.		Sensitivity: Low Magnitude: Low Significance: Not Significant Permanent, Not Significant negative effects
Other Species of Low Conservation Significance (as listed in 8.3.5.2.3) (Low)	These species were determined to be less at risk from potential impacts associated with the Proposed Project, as they have a more favourable conservation status, were rarely recorded during surveys, or are not thought to be dependent on the area for wintering or feeding.		Sensitivity: Low Magnitude: Negligible Significance: Imperceptible Permanent, Imperceptible negative effects

Note: * Percival Significance Evaluation is calculated as a product of the sensitivity (based on a species collision risk) of the species and the magnitude (Table 8.20) of the effect.

8.7.5.2 Wintering Birds – Summary of Effects During the Operational Phase

928. Table 8.92 summarises the potential Operational Phase impacts on wintering birds. There would be no likely significant effects.

Table 8.92: Summary of Pre-Mitigation Effects Upon Wintering Birds During the Operational Phase of the Proposed Project

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Potential Significant Effect
Black-headed gull	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary, O'Briensbridge, County Clare	- Habitat loss and fragmentation - Disturbance/displacement - Collision risk	- Potential impacts associated with the Proposed Project on suitable wintering bird habitats along the Treated Water Pipeline would be temporary. Habitats would be restored to pre-existing ground conditions. It is expected that wintering bird species would reoccupy disturbed habitat during the Operational Phase, following reinstatement. Therefore, there would be no likely significant effect during the Operational Phase. - Suitable wintering bird habitats would be permanently lost as a result of the construction of the RWI&PS, WTP, BPT, BPS, FCV and TPR. However, at these infrastructure sites limited wintering bird activity was recorded. Given that there are extensive areas of suitable wintering habitat available adjacent to these sites and in the wider surrounding landscape, impacts associated with loss of habitat would result in Imperceptible to Slight, permanent negative effects at a local geographic scale. - An increased human presence at the RWI&PS, WTP, BPT, BPS, FCV and TPR during the Operational Phase may cause disturbance to wintering birds. However, the level of operational activity is expected to be sufficiently low to avoid any disturbance impacts on wintering birds that use the Proposed Project. It is considered that these impacts would be temporary and would not result in a likely significant effect. - Following the completion of the 38 kV Uprate Works, a permanent power cable would be in place during the Operational Phase. This may pose a collision risk with wintering birds. However, as there are already existing powerlines in place and no collisions were recorded over the entirety of the survey period, impacts associated with collision risk are predicted to be negligible to low in the long-term.	No
Coot	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary, O'Briensbridge, County Clare			No
Cormorant	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary, O'Briensbridge, County Clare			No
Curlew	Red Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary, O'Briensbridge, County Clare			No
Gadwall	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare)			No
Golden Plover	Red Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), BPS site, County Offaly, Peamount, County Dublin			No
Goldeneye	Red Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary			No
Great crested grebe	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary, O'Briensbridge, County Clare			No
Hen harrier	Annex I EC Birds Directive	A small number of peatland habitats along the route of the Treated Water Pipeline in County Offaly			No
Herring gull	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary, O'Briensbridge, County Clare, Peamount, County Dublin			No
Lapwing	Red Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary, O'Briensbridge, County Clare, BPS site, County Offaly, Peamount, County Dublin			No
Lesser black-backed gull	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary, O'Briensbridge, County Clare, Peamount, County Dublin			No

Key Ecological Receptor	Evaluation	Area	Potential Construction Phase Impact(s)	Assessment of Potential Impact	Potential Significant Effect
Mallard	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary, O'Briensbridge, County Clare	- Habitat loss and fragmentation - Disturbance/displacement - Collision risk	- Potential impacts associated with the Proposed Project on suitable wintering bird habitats along the Treated Water Pipeline would be temporary. Habitats would be restored to pre-existing ground conditions. It is expected that wintering bird species would reoccupy disturbed habitat during the Operational Phase, following reinstatement. Therefore, there would be no likely significant effect during the Operational Phase. - Suitable wintering bird habitats would be permanently lost as a result of the construction of the RWI&PS, WTP, BPT, BPS, FCV and TPR. However, at these infrastructure sites limited wintering bird activity was recorded. Given that there are extensive areas of suitable wintering habitat available adjacent to these sites and in the wider surrounding landscape, impacts associated with loss of habitat would result in Imperceptible to Slight, permanent negative effects at a local geographic scale. - An increased human presence at the RWI&PS, WTP, BPT, BPS, FCV and TPR during the Operational Phase may cause disturbance to wintering birds. However, the level of operational activity is expected to be sufficiently low to avoid any disturbance impacts on wintering birds that use the Proposed Project. It is considered that these impacts would be temporary and would not result in a likely significant effect. - Following the completion of the 38 kV Uprate Works, a permanent power cable would be in place during the Operational Phase. This may pose a collision risk with wintering birds. However, as there are already existing powerlines in place and no collisions were recorded over the entirety of the survey period, impacts associated with collision risk are predicted to be negligible to low in the long-term.	No
Mute swan	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary, O'Briensbridge, County Clare			No
Pochard	Red Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary			No
Redshank	Red Listed (BoCCI)	Parteen Basin, County Tipperary, O'Briensbridge, County Clare			No
Shoveler	Red Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary			No
Snipe	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary, Peatland sites in County Offaly			No
Teal	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary			No
Tufted duck	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary			No
Whooper swan	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary			No
Wigeon	Amber Listed (BoCCI)	Lough Derg (Counties Galway, Tipperary and Clare), Parteen Basin, County Tipperary			No
Other Species of Low Conservation Significance (as listed in Table 8.48, Table 8.50 and section 8.3.5.2.3)	Red, Amber and Green Listed (BoCCI)	Throughout the Proposed Project including 38 kV Uprate			No

8.8 Mitigation and Monitoring Measures During the Construction Phase of the Proposed Project

929. Mitigation measures are proposed herein, with reference to guidance documents that are considered best practice, to avoid and/or reduce the potential impacts of the Proposed Project on biodiversity during the Construction Phase. Monitoring measures will confirm the implementation of conditions and/or planning agreements, audit predicted impacts against the actual situation, and take measures to rectify unexpected negative impacts and ineffective mitigation, compensation and enhancement measures (CIEEM 2018).
930. In the event of approval being granted for the Proposed Project and prior to commencement of works, the appointed Contractor(s) will refer to the Construction Environmental Management Plan (CEMP) (Appendix A5.1), methodologies described in Chapter 5 (Construction & Commissioning), and the mitigation measures contained in this EIAR. All mitigation measures will be implemented by the appointed Contractor, under the supervision of an Ecological Clerk of Works (ECoW) to ensure they are fully implemented and will prevent or reduce the potential impacts identified in this impact assessment.
931. A suitably qualified ECoW/team of ECoWs 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 contained in the EIAR, NIS and register of environmental actions and commitments (within Appendix A5.1:CEMP), and to act as a liaison between Uisce Éireann and the Planning Authority in the discharge of planning conditions relating to flora and fauna. The ECoW role will be undertaken and/or supervised by an ecologist with the relevant expertise and level of experience. The role of the ECoW will include:
- Pre-construction monitoring surveys to confirm the presence of protected species and INNS and pathogens
 - Arranging relevant licensing (if required)
 - Supervising construction works and ensuring compliance with legislation
 - Monitoring habitats and species during the course of construction works and effectiveness of mitigation
 - Providing advice regarding the avoidance and minimisation of potential disturbance to wildlife
 - Providing recommendations on appropriate responses/actions to site-specific issues (e.g. identification of previously unrecorded breeding sites during construction works)
 - Liaising with NPWS, IFI and other prescribed authorities, when required.
932. The Proposed Project has been designed to reduce the effect on biodiversity as far as reasonably practicable. With the exception of the Lower River Shannon SAC, the Proposed Project avoids all designated European sites. Non-designated habitats that meet the criteria of Annex I habitats were also avoided during the route selection process and habitats of high suitability for protected species were avoided, where feasible.
933. The proposed locations for the RWI&PS, WTP, BPT, BPS, FCV, TPR, Pipe Storage Depots and Construction Compounds were carefully selected for the least potential impact by carrying out a multi-criteria analysis of the potential impacts on environmental criteria such as Annex I habitats, local importance (higher value) habitats, Annex II species and flora and fauna protected under the Wildlife Acts, for each of the potential sites (Jacobs/Tobin 2016). With the exception of the RWI&PS, none of the infrastructure sites contain habitats or water bodies of value greater than local importance (higher value).

934. A number of potential abstraction locations and abstraction regimes were identified in Lough Derg and Parteen Basin. A hydrological and water quality modelling exercise was undertaken to assess the existing flushing characteristics of Lough Derg and Parteen Basin to determine what, if any, changes would occur as a result of the options identified. This resulted in the abstraction point and regime being designed and located where there would be the least impact on the residence time¹² of Lough Derg and Parteen Basin.

8.8.1 Designated Areas of Nature Conservation

935. Mitigation measures to avoid/reduce significant effects on Screggan Bog NHA, Grand Canal pNHA, Annaghmore Lough Fen (Offaly) pNHA, Willsborough Esker pNHA, Clonad Wood pNHA and Mount St. Joseph Woods pNHA, as a result of potential surface water quality impacts and/or dust impacts during construction, are the same as the measures outlined in Section 8.8.3, and therefore are not repeated here.
936. Mitigation measures for European sites specifically, are outlined in Section 7 of the NIS, and therefore are not repeated here.

8.8.2 Terrestrial Ecology

8.8.2.1 Terrestrial Habitats and Rare/Protected Flora

8.8.2.1.1 *Mitigation Measures to Reduce the Potential for Impacts on Habitats and Rare/Protected Flora (Habitat Retention, Replacement and Landscaping)*

937. Following the mitigation hierarchy of avoidance, minimisation, and restoration, where feasible, best practice designs have avoided sensitive areas with high ecological value and will ensure the quality of the landscape is retained and protected. Where avoidance and minimisation are not feasible, in order to mitigate for the temporary loss of habitats and reduce significant negative effects, following completion of the construction works the general principle is that the land would be reinstated/restored on a 'like for like' basis, based on the habitat/features that were on site before the works commenced, which is considered best practice and is in line with EPA guidelines (EPA 2022). This would include the reinstatement of the soils, drainage, fencing and vegetation on a 'like for like' basis. The overall design of the Proposed Project includes management of topsoil and subsoil stockpiles and reinstatement planting (Chapter 5: Construction & Commissioning). The 'like-for-like' replanting of habitats will be in accordance with recommendations by an ECoW, taking into consideration the All-Ireland Pollinator Plan 2021-2025 (NBDC 2021) and the Pollinator Friendly Planting Code (NBDC 2022), to ensure locally sourced appropriate native species which are in line with the existing genetic strain are used. Replanting of vegetation and general landscaping will be monitored by the ECoW.
938. Prior to construction commencing, planning will occur for each area to be disturbed, giving consideration to the following aspects:
- Identification of any areas to be protected, including important ecological features
 - Water environment features
 - Identification of any notable features to be restored; and
 - Provision of sufficient and suitable space for the separate storage of turves/topsoil, peat and or subsoils.

¹² Flushing/residence time or lake retention time is a calculated quantity expressing the mean time that water (or some particular dissolved substance) spends in the lake and expresses the amount of time taken for a substance introduced into a lake to flow out of it again.

939. The general principles for reinstatement involve the replacement of the excavated soils in the correct order in which they were excavated. The following measures will be observed during this phase of the works:

- Reinstatement will occur as soon as possible upon completion of the works in order to minimise the time for which soil or peat are required to be stored and the period of exposed excavations. However, this will be subject to careful planning by the Contractor to avoid the necessity to track back over areas of previously restored ground or further disturbance of recovering areas
- As far as possible, creation of slopes at gradients suitable for the placement of soils/peat and where necessary, suitable slope stabilisation measures to assist revegetation and prevent erosion
- Replacement of soils/peat in the correct horizons
- Avoidance of compaction of soil or peat
- Adoption of a phased approach to avoid tracking back or disturbing areas previously reinstated
- Natural regeneration of vegetation, where feasible, by reusing the stored topsoil seedbank from its original location for reinstatement
- For semi-natural grassland habitats (e.g. GS1, GS2, GS3, GS4), where necessary, the locally sourced seedbank present within the surrounding land will be used for grassland restoration following the green hay transfer method (as per Great Irish Grassland guidance), to assist the natural regeneration
- Where natural regeneration is not feasible, or where specific plant species need to establish quickly, habitats will be reinstated by preparing the soil appropriately (i.e. with the existing soil geographic factors, including soil type, soil pH and nutrient content) and reseeded with native locally sourced species specific to the habitat in question.

940. Habitats which cannot be reinstated on a 'like-for-like' basis (e.g. PB1 mosaic habitats and PF2) due to their unique composition and underlying processes which contribute to their existence, will be reinstated with a habitat similar to that of PB4 in the case of PB1 habitat and species rich GS3 in the case of PF2 habitat. The reinstatement of PB1 habitat will be carried out as per Appendix A5.3 (Methods of Working in Peat) whereby excavated peat material would be used to backfill the excavation around the pipeline in approximately the same layers and depths that it was excavated from. The reinstatement would include going over the top of the pipeline. The replacement of PF2 habitat will be consistent with the already present species rich GS3 habitat at this location. Reseeding will be carried out using the existing seedbank. The organic and topsoil layers contain peaty soils, and reinstatement will be carried out as per Appendix A5.3 (Methods of Working in Peat) to ensure successful re-establishment of the diverse species present at this location. Heath habitat (i.e. HH1 and HH3) will be reinstated as per Appendix A5.3 (Methods of Working in Peat). Reseeding will then be carried out with ling heather and bell heather brash with additions of locally sourced bilberry and crowberry (*Empetrum nigrum*), shrubs, sedges (e.g. green-ribbed Sedge (*Carex binervis*) and natural grasses (e.g. bents and fescues)).

941. The reinstatement of linear habitats will also be carried out on a 'like-for-like' basis (where feasible) and as per the Biodiversity Guidance for Uisce Éireann Developments (UÉ-AMT-GL-021) (Uisce Éireann 2023b) and Figure 4.98 (Root Barrier and Hedgerow Reinstatement) in Chapter 4 (Project Description) which will be implemented as follows:

- All severed linear habitats, with the exclusion of within the infrastructure sites and permanent access roads to the infrastructure sites, will be replanted to ensure connectivity with the wider landscape is restored. Replanting will commence once works have been completed in an area (approximately every 10km). Reinstating linear corridors along the Proposed Project once works have been completed will reduce the overall impact of habitat fragmentation. All planted vegetation will be a mix of locally sourced native species that are known to occur in the general area and for the specific habitat type

- Where a hedgerow/treeline is to be reinstated it will be done so using a mix of age classes from feathered whips and advanced nursery stock to develop an immediate hierarchy in the structure. Where gaps within an existing hedgerow/treeline are to be bolstered, it will also be done so using a combination of mainly feathered whips and occasional advanced nursery stock (minimum 10 to 12cm girth trees to fill gaps). This method employs the principles of 'under-planting' feathered whips to the inside of the existing hedgerow and 'inter-planting' of whips and advanced nursery stock within gaps
 - Impacts to linear habitats caused by access requirements were avoided where practicable through the selection of designated access/egress points to the Proposed Project, and to other work sites (Chapter 5: Construction & Commissioning) via the public road network, existing farm access points, and gaps in hedgerows. Existing gates onto local roads will be used rather than creating additional hedgerow/treeline gaps
 - Planting of linear habitats and general landscaping will be monitored by the ECoW and will be subject to a condition assessment post-construction (see Section 8.10.2.1 for further details), which will assess the condition of replanted/reinstated natural habitats for terrestrial biodiversity (Foulkes *et al.* 2013), to confirm their successful establishment.
942. Treelines cannot be reinstated over the 20m wide Permanent Wayleave as their root system would impede upon the underlying pipeline infrastructure as per Uisce Éireann Tree Protection Guidance (IW-AMT-GL-026) (Uisce Éireann 2022). In line with this guidance, certain tree species (e.g. blackthorn, hawthorn, dog rose (*Rosa canina*)) can be planted directly over the pipeline due to their growth habit and root system, followed by those which can be planted at a distance of 1.5m away (e.g. holly, guelder rose, elder (*Sambucus nigra*) and hazel), 3m to 6m away (crab apple (*Malus sylvestris*), wild cherry (*Prunus avium*), rowan (*Sorbus aucuparia*) and spindle) and those which must be planted >6m from the pipeline (oak (*Quercus petraea* and *Q. Robur*), willow (*Salix alba*, *S. Aurita*, *S. Caprea*, *S. Cinerea* subsp. *Oleifolia*), alder, birch (*Betula pendula* and *B. Pubescens*)), with woodland planting (groups of trees) at a distance >10m. As a result, the reinstatement of treelines over the 20m wide Permanent Wayleave will consist of a mosaic habitat similar to that of a mature hedgerow.
943. Any habitats including trees, scrub or hedgerows adjacent to, or within, the Proposed Project which are intended to be retained will be afforded adequate protection by complying with the NRA guidance (NRA 2006c), prior to construction works commencing. The mitigation measures which will be implemented will include as follows:
- All trees along the Proposed Project that are intended to be retained, both within and adjacent to the boundary (where the Root Protection Area (RPA) of the tree extends into the boundary), will be fenced off in the adjacent working area prior to the commencement of any on-site construction activity and for the duration of the construction works in that area to avoid structural damage to the trunk, branches or root systems of the trees. Temporary fencing will be erected at a sufficient distance from the tree so as to enclose the RPA of the tree. In general, the RPA covers an area equivalent to a circle with a radius 12 times the stem diameter (measured at 1.5m above-ground level for single stemmed trees, or above the root flare for multi-stemmed trees)
 - Where fencing is not feasible due to insufficient space, protection for the trees will be afforded by wrapping hessian sacking (or equivalent) and timber strips clad around the tree
 - The area within the RPA will not be used for vehicle parking or the storage of materials (including soils, oils and chemicals). The storage of hazardous materials (e.g. hydrocarbons) will not be undertaken within 10m of any retained trees, hedgerows or treelines
 - If construction activities are required within the RPA, e.g. excavation work, then a qualified arborist will advise on the best methods for protecting the tree. For example, any excavation works carried out within the RPA will need to avoid damage to the protective bark covering larger roots. This may involve excavation by mini-digger and/or hand as deemed appropriate. Exposed roots will be wrapped in a hessian sacking to avoid desiccation and roots less than 2.5cm in diameter could be pruned back to a side root. The advice of a qualified arborist will be sought if larger roots that

influence anchorage need to be severed. Any remedial works required to trees will be carried out by a qualified arborist

- Where tree removal may be required (due to health and safety considerations) in areas not previously identified, liaison with a suitably qualified ECoW will be undertaken.

944. Tree cutting and lopping will be minimised. All trees will be pollarded (with the exception of mature trees which are not suitable) by qualified foresters/tree surgeons so as to retain as much of the treeline/linear habitat structure and in a manner which retains ground flora species and does not kill the tree. The trimming regime will involve a scalloping or profiling effect which will minimise the effect on vegetation. Overall, it will not change the structure and ecological function of the linear woodland features and will not measurably affect associated fauna post construction.

945. A landscaping design is outlined in Chapter 16 (Landscape & Visual) and Landscape Plans for each infrastructure site in Chapter 4 (Project Description) Figure 4.89 to Figure 4.97 and Figure 4.99. Landscape planting measures will include the following:

- The RWI&PS (Chapter 4: Project Description, Figure 4.92 and Figure 4.93) will consist of woodland planting of species similar to that of the existing WN2 habitat, mosaic planting of native scrub and trees (as per Uisce Éireann Tree Protection Guidance), retention of the existing hedgerow at the entrance with native tree planting and species rich semi-natural grassland (referred to in the Landscape Plans as wildflower mix) either side of the site access road
- The WTP (Chapter 4: Project Description, Figure 4.96 and Figure 4.97) will consist of native screen planting, mosaic planting of scrub and native trees (as per Uisce Éireann Tree Protection Guidance), proposed native woodland (WD1) planting and the reinstatement of GS4 habitat in the north of the site. The site entrance will consist of native tree planting and species rich semi-natural grassland either side of the site access road
- The BPT (Chapter 4: Project Description, Figure 4.90 and Figure 4.91) will consist of native screen planting, mosaic planting of scrub and native trees (as per Uisce Éireann Tree Protection Guidance), areas of native woodland (WD1) and the retention of scrub habitat in the southwest of the site. The site entrance will consist of species rich semi-natural grassland and retention of the existing hedgerow
- The BPS (Chapter 4: Project Description, Figure 4.89) will consist of native screen planting, mosaic planting of scrub and native trees (as per Uisce Éireann Tree Protection Guidance), species rich semi-natural grassland and the planting of a new hedgerow on the boundary of the BPS entrance as per the Biodiversity Guidance for Uisce Éireann Developments (UÉ-AMT-GL-021) (Uisce Éireann 2023b)
- The FCV (Chapter 4: Project Description, Figure 4.99) will consist of mosaic planting of native scrub and trees (as per Uisce Éireann Tree Protection Guidance), species rich semi-natural grassland and the planting of a new hedgerow on the boundary of the site as per the Biodiversity Guidance for Uisce Éireann Developments (UÉ-AMT-GL-021) (Uisce Éireann 2023b)
- The TPR (Chapter 4: Project Description, Figure 4.94 and Figure 4.95) will consist of new and reinstated hedgerows (as per the Biodiversity Guidance for Uisce Éireann Developments (UÉ-AMT-GL-021) (Uisce Éireann 2023b)), mosaic planting of native scrub and trees (as per Uisce Éireann Tree Protection Guidance) and species rich semi-natural grassland.

946. Two species of formerly protected, rare flora were recorded within the Proposed Project; basil thyme (formerly FPO species; Red Listed) and yellow archangel (Red Listed). To ensure the protection of these species, the appointed ECoW will review all construction works in the ZOI of these plants and will implement appropriate measures to protect them. In all instances, the priority will be to leave the plants *in situ* in order to avoid or minimise disturbance, but where this is not feasible, the plants will be translocated permanently. Potential translocation areas are shown in the Environmental Masterplan (Figure 4.106 to Figure 4.184). It is proposed that these species, which comprise some individual plants growing within the footprint of the Proposed Project, will be translocated to nearby unaffected areas along

the perimeter of the Construction Working Width with suitable habitat conditions for the plants to successfully grow and establish. The exact translocation area(s) will be agreed with the ECoW. The number of affected plants to be translocated will be very small in extent and scale. The approach employed will be as per Appendix A5.1 (CEMP), and as follows:

- Ensure appointed Contractors are aware of all ecological sensitivities prior to commencement of works
- Assign designated areas for stockpiling of excavated material during construction in consultation with an ECoW to avoid disturbance and loss of any rare/protected flora
- Exclusion zones will be established by installing temporary fences around the rare/protected flora
- Where feasible, plants will be left *in situ* and protected during construction
- Where impacts are unavoidable, prior to clearance works taking place, plants will be translocated in autumn when soils are warm and moist and new root growth is possible before the onset of winter, as directed by the ECoW
- The vegetated topsoil (known as turves) will be dug to a depth of 300mm in discrete block sections (to minimise the soil particles breaking up) using an excavator bucket and side-cast for translocation. The turves will be stored separately from subsoil. Careful attention will be made not to side-cast (depositing at the side of the excavation works) the vegetated topsoil/turves where existing records of basil thyme and yellow archangel occur in the immediate surroundings to avoid smothering of vegetation
- Shallow excavations (300mm depth) with an excavator bucket will be carried out at the receptor area to facilitate translocation of the specimens
- The vegetated turves containing the specimens will be carefully translocated in blocks (vegetation side up) and placed within the recently dug out receptor area and reinstated with excavated material to ensure that the translocated turves are firmly in place and that the plant specimens are facing vegetation side up
- Subsequent watering of the translocated turves will be carried out during periods of dry weather in autumn
- Ensure that the works are carried out during periods of dry weather
- All plant and equipment will be cleaned down before leaving site
- Staff will be briefed on the presence on invasive species and pathogens in the area and the guidelines associated with their management.

947. Proposed land access routes to each 38 kV poleset were identified which will avoid/minimise the potential for significant ecological impacts on terrestrial habitats (Figure 8.4 to Figure 8.10). In general, existing trackways will be utilised while accessing the polesets. With regards access to the 38 kV Uprate Works, construction techniques and machinery/equipment may vary to accommodate localised ground conditions along specific parts of the route and/or as a result of weather conditions during the construction period. Access in any peat area or wetland 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 proposed works. In very poor, soft, boggy and/or undulating land, stone roads may need to be constructed. In such instances geotextile reinforcement would be placed on the surface and stone placed on top and compacted to form the track. However, stone roads are not anticipated to be needed for the proposed 38 kV Uprate Works. These measures will mitigate any significant effects in relation to degradation of terrestrial habitats within the Zol of the proposed works.

948. In relation to the 38 kV Uprate Works access, if a proposed access route should become unavailable during construction, an alternative access route would be identified by the Project Team, developed in accordance with the relevant method statements and agreed with the relevant Local Authority. Any alteration to temporary access routes for the 38 kV Uprate Works will be agreed with the ECoW in advance to ensure avoidance of impacts to ecologically sensitive receptors. The general principles to guide the decisions on identifying potentially suitable temporary access routes and tracks and mitigate potential impacts are as follows:

- The public road network will be used for the delivery of materials, plant and equipment from off-site compounds to the development corridor and individual structures. The use of certain unclassified roads is also likely to be required
- Existing tracks on private land will be used
- Defining the route of temporary access tracks to structure locations (on private lands) sought to:
 - Minimise intrusion to and disturbance of the surrounding area and local communities
 - Maximise use of existing farm entrances, farm tracks/roads and bridges, where feasible. The use of private accesses to residential properties will be avoided wherever practicable for safety and amenity reasons. Where this is unavoidable, access arrangements will be agreed with landowners
 - Minimise the amount of new temporary entrances, and access tracks/roads, where feasible. Where necessary, new access tracks will typically be 3m in width. The width of tracks will be minimised where practicable and where safety and design are not compromised
 - Avoid environmentally sensitive areas where practicable (e.g. SACs, SPAs, NHAs and pNHAs)
 - Cause least disturbance to and minimise impacts to natural heritage interests (including watercourses)
 - Cause least disturbance to current land use and farm/land management practices.

949. Details of alternative types of track relative to land use, condition, and having regard to specific environmental conditions are set out below. It is noted that these are not mutually exclusive in all cases and that a particular access track may incorporate different track types along its entire length:

- In general, the construction of temporary tracks is not required on good quality land (i.e. in areas of very dry pasture). Using tracked machinery (low ground pressure vehicles, where feasible) usually means that access to structure sites can be achieved with relative ease
- In arable land (where topsoil removal is not required) and other sensitive situations, aluminium road panels will be used
- In relatively dry land, peat land or very sensitive areas, where a defined track is required, temporary bog matting will be used. Low ground pressure vehicles will also be used where feasible
- In very poor, soft, boggy and/or undulating land, stone roads may need to be constructed. Geotextile reinforcement will be placed on the surface and stone placed on top and compacted to form the track. Alternatively, timber sleepers can be used
- Where very poor and/or soft boggy ground is encountered, such as areas of wet heath (HH3) and wet grassland (GS4), it may be necessary to construct a temporary stone access road or track to facilitate access to the poleset.

950. It is important to note that the proposed access methodologies are based on ground conditions as assessed during the ecological surveys carried out from 2018 to 2025. During the pre-Construction Phase of the 38 kV Uprate Works, these will need to be verified by the supervising ECoW in liaison with the Site Engineer/Site Manager, to confirm that they remain appropriate to the conditions present at the time of construction.

951. Where excavations are being undertaken as part of the 38 kV Uprate Works poleset replacement, the following procedures to reduce the potential for impacts on habitats will be employed:
- At polesets, excavated material including turves and soil will be temporarily stored (for approximately one to two days, thereby avoiding the potential to dry out) separately alongside the excavations
 - Stockpiling of excavated materials will be located within designated areas away from watercourses as per IFI (2016) guidelines
 - Existing poles will be cut below ground level
 - Excavations will be carefully backfilled with excavated material
 - The surface turves will be replaced (vegetated side up) and firmed into place with the back of the excavator bucket.
952. A similar approach will be followed for excavations required for the new 38 kV interpoles. Excess excavated material will be used on-site to backfill and support the structures insofar as possible. If required, any additional material that cannot be reused on-site will be managed as per the mitigation options which are set out in Chapter 19 (Resource & Waste Management).
953. In relation to impacts on biodiversity associated with dust during the Construction Phase of the Proposed Project, the following mitigation measures, summarised herein and detailed in Appendix A12.1 (Dust Mitigation Measures), will be implemented, as per the IAQM Guidance on the Assessment of Dust from Demolition and Construction (IAQM 2024). Stockpiles and mounds will be kept away from sensitive receptors, watercourses and surface drains where reasonably practicable, and sited to take into account the predominant wind direction relative to sensitive receptors. During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate so that moisture content is high enough to increase the stability of the soil and thus suppress dust. Solid screens or barriers will be erected around dust activities or the site boundary that are, at least, as high as any stockpiles on site. Stockpiles will be covered, seeded or fenced to prevent wind whipping. Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. Prior to demolition of any properties, they will be soft stripped inside the buildings (retaining walls and windows in the rest of the building where feasible, to provide a screen against dust). All cutting, grinding or sawing equipment on site will be fitted with or used in conjunction with dust suppression techniques e.g. water sprays or local extraction. Rubble chutes will be shielded or enclosed or use of water to suppress dust emissions from such equipment. Where there are potentially dust-emitting activities on site, as a minimum, a daily visual inspection will be made, and a yes/no record kept of whether there is a risk of dust emissions that day.

8.8.2.1.2 Mitigation Measures to Reduce the Potential for Impacts on GWDTEs

954. The main pipeline works will only be carried out outside of the winter period (which is considered to be from December to February inclusive). There will have to be some pre-advanced works, such as installation of temporary fencing, access gates and hedgerow clearance, ahead of the main pipeline works. The proposed timing and control measures will limit sediment impacts and groundwater impacts in particular near sensitive habitats, including Derrinclare Fen, Coagh Fen, and Coolfin Glebe (transition mire) (see Table 8.52). In terms of design requirements, runoff from the construction would be managed on-site, collected and treated prior to discharge. All groundwater intercepted during the Construction Phase will be managed and discharged within the same GWB.

955. When a trench for the main pipeline works is temporarily dewatered, the water drawn into it results in a dewatered area, i.e. a cone of depression or influence. The shape of the cone and the rate at which it expands depends on the dewatering depth, length of dewatering, aquifer parameters. Based on the excavation depth and short-term pumping required, the dewatering effects are predicted to extend less than 200m. Groundwater from the trench will be treated and discharged during the Construction Phase. Therefore, the short-term works for the Proposed Project will limit potential drawdown at sensitive areas.
956. Where dewatering is required along the Proposed Project, dewatering will be undertaken in accordance with CIRIA C750 Groundwater Control – Design and Practice 2nd Edition (CIRIA 2016). Mitigation measures (as detailed in the 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.
957. During construction of the pipeline, shallow toe-drains will be installed along the edges of the Construction Working Width to intercept overland flows from adjoining lands; they will also catch runoff from the stockpiles of topsoil and subsoils resulting from the excavation of the trenches.
958. During pipeline construction, trenches will not be left open for extended periods of time (more than two to three days). Trenches will only be dug to lengths which can be constructed each day. All trenches will be backfilled once the section of pipe is installed. This will prevent pooling of surface waters within open trenches.
959. These toe-drains, which are 500mm to 750mm deep comprising perforated pipe surrounded in 150mm of stone, will drain into temporary attenuation lagoons which will be located along the pipeline route at regular intervals, as required, as construction progresses. These will collect surface waters flowing over the Construction Working Width, from the toe-drains, and the groundwater from the pipe trench excavation.
960. The attenuation lagoons will be sized to ensure final discharge is within the prescribed limit (i.e. $\leq 25\text{mg/L}$ Total Suspended Solids (TSS) in accordance with the Quality of Salmonid Waters Regulations (1988)).
961. They 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. Siltbuster tanks will be available for use where TSS exceeds 25mg/L.

8.8.2.1.3 Mitigation Measures to Control and Prevent the Spread of Terrestrial Invasive Non-Native Species and Pathogens

962. Butterfly bush, wall cotoneaster, montbretia, snowberry, cherry laurel, giant hogweed, rhododendron, winter heliotrope, Himalayan balsam and Japanese knotweed were the only terrestrial INNS found to occur within the Proposed Project. The following terrestrial INNS were also recorded by surveyors outside of the Proposed Project but within the study area:

- Cherry laurel
- Common milkweed
- Wall cotoneaster
- Montbretia
- Snowberry
- Giant hogweed
- Japanese knotweed
- Himalayan knotweed
- Himalayan balsam
- Giant rhubarb
- Rhododendron
- Traveller's-joy
- Butterfly-bush

963. The presence of INNS within the study area provides the potential for the spread of these species by the proposed construction works.

964. The introduction and/or spread of INNS will be avoided by adopting appropriate mitigation measures (as set out below) with regard to the following guidance documents:

- The Management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII 2020a)
- The Management of Invasive Alien Plant Species on National Roads – Standard (TII 2020b)
- Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA 2010)
- Managing Japanese knotweed on development sites – the Knotweed Code of Practice. Version 3, amended in 2013, withdrawn from online publication in 2016 (Environment Agency 2013). This document, although no longer supported by the Environment Agency, is nonetheless a practical document in determining the approach and control mechanisms for Japanese knotweed
- AM-SOP-009 Information and Guidance Document on Japanese Knotweed (Uisce Éireann 2018)
- IW-AMT-GL-001 Irish Water Guidance on the Management of Giant Hogweed (Uisce Éireann 2024a)
- IW-AMT-GL-002 Irish Water Guidance on the Management of Himalayan Balsam (Uisce Éireann 2024b).

965. A Non-Native Invasive Species Management Plan has been prepared and included in the CEMP (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.
966. Any invasive non-native plant material noted on-site or within 15m of working areas will be treated and/or removed off site and disposed of at an appropriate licensed waste disposal facility, in compliance with the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) (as amended). The presence of INNS and requirement for actions will be confirmed and supervised by an ECoW.
967. As the INNS recorded during the baseline surveys may spread, or their distribution may change, prior to the commencement of construction works, a pre-construction re-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 (S.I. No. 477/2011) (as amended). In accordance with the TII guidance (TII 2020a) this survey will produce accurate 1:5,000 scale mapping for the precise location of invasive species. The pre-construction survey will be undertaken by suitable experts with competence in identifying the species concerned. If any new INNS are found to be present on-site, the ECoW will be notified and will develop the required control methodologies.
968. 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 ECoW 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.
969. 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.
970. 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 (NRA 2010; TII 2020a; TII 2020b), IFI (2010) and Uisce Éireann (2018; 2024a; 2024b), 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 7m 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 as far as practical. 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
- 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.

971. A precautionary approach will also be taken to prevent the intentional spread or acceleration of the natural spread of ash dieback in the ZOI of the Proposed Project. Pre-construction surveys of all treelines and hedgerows which would be removed as part of the Proposed Project will be undertaken by a qualified arborist. All trees noted as having ash dieback will be flagged and demarcated. If ash trees are young, uprooting is possible. Larger trees will be cut as close to ground level as possible with the tree stump treated with glyphosate herbicide (McCracken *et al.* 2017). Cut trees will be removed to a licensed landfill site. Chipping will be carried out for larger trees under a covered trailer and chips removed to a licensed landfill facility (McCracken *et al.* 2017). The understorey and ground of affected hedgerows and treelines will be thoroughly checked for dead leaf litter (includes bark, leaves, twigs, remaining roots) and trimmings by the arborist, and removed to a licensed landfill facility (Sansford 2015) as dead leaf litter is key in the life cycle of ash dieback and the primary source of risk of the disease (Sansford 2015).

8.8.2.2 Mammals – Bats

972. The following mitigation measures for the protection of bats are in accordance with Bat Mitigation Guidelines for Ireland – V2 (Marnell *et al.* 2022) which is the principal guidance in relation to bat mitigation in Ireland. Reference is also made to the NRA Guidelines (Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA 2006a) and the Guidelines for the Treatment of Bats during the Construction of National Road Schemes (NRA 2006b)) and will be implemented by the appointed Contractor.

8.8.2.2.1 Avoidance

973. The most successful and effective way to mitigate negative impacts on bats is to avoid areas of high activity or roosts. The route of the Proposed Project was carefully selected to avoid as many areas of potentially high bat activity as possible. This included avoiding buildings, woodlands, and mature trees where practicable, and maximum avoidance of the removal of treelines and hedgerows. For example, the Proposed Project was re-routed to avoid a Natterer's bat roost and an area of very high activity in Ashley Park, County Tipperary. The Proposed Project is now located approximately 960m north of this roost.

974. Structures, treelines and mature trees with roosts, that are located immediately adjacent to the Proposed Project or are not directly impacted, will be avoided and retained intact. No lighting or heavy machinery will be in operation adjacent to the roost(s). Tall linear vegetation immediately adjacent to the roost(s) will be protected to ensure that there is commuting and foraging habitat within 50m of the roost(s). Overall impacts on these sites will be reduced through modified design and sensitivity during construction. Any trees and treelines along approach roads and planned site access roads (with the exception of site lines) will be retained. Retained trees will be protected from root damage by machinery, by an exclusion zone (Section 8.8.2.1). Such protected trees will be fenced off by adequate temporary fencing prior to other works commencing.

8.8.2.2.2 *Pre-Construction Surveys*

975. Tree roosts may be established for short periods and may not be detectable when bats are not occupying the roost during an examination of a suitable tree. Furthermore, trees may become suitable for roosting bats through damage from storms, machinery, rot or human interference; therefore, trees that are at present unsuitable may become roosts between the field assessment and construction. Therefore, all trees with medium to high roost potential will be examined by a suitably qualified ECoW prior to felling as part of the pre-construction survey.
976. Where a new roost is confirmed (post consent) within a tree during a pre-construction survey, and where the tree is required to be felled, it will be necessary to seek derogation from the NPWS to exclude the bats and fell the tree. The roost must not be altered or affected in any way prior to the time of felling. Felling must be carried out under the supervision of a bat specialist named on the licence, using the measures stipulated in the licence for the exclusion of bats. Appropriate mitigation will be implemented as per the licence requirements.

8.8.2.2.3 *Seasonal Timing of Works*

977. Breeding colonies of bats using tree roosts are very vulnerable to disturbance during the summer months, when juvenile bats that cannot yet fly are in the roost. Therefore, all mature trees in need of removal that have been identified as having a moderate to high PBRs will be felled in the autumn or spring months during mild weather in order to avoid any breeding populations. Felling of these trees must also be avoided in cold winter months as there is the potential for bats to be in hibernation and therefore unable to escape (NRA 2006b). These measures will ensure no active roost is destroyed.

8.8.2.2.4 *Tree and Tree-Line Removal*

978. Where the removal of trees that have been identified as PBRs is unavoidable, these will be resurveyed in consultation with the tree contractor. If it becomes apparent that there are bats residing in the tree, NPWS will be informed, a licence will be obtained, and the bats will be relocated by the bat specialist under licence. The following measures will be undertaken:
- Trees identified as a PBR and proposed to be felled will be re-surveyed (dusk survey coupled with night-vision aids). This will be undertaken at least one month prior to tree felling in order to propose a tree felling plan in conjunction with tree contractors. Trees with roosting features (e.g. dead wood, tree holes) will be physically checked prior to felling (using an endoscope and high-power torch) or a dusk/dawn surveys completed to determine if bats are roosting within
 - Erection of alternative roosting sites (i.e. woodcrete bat boxes). These are required to be erected six months prior to tree felling to allow local bat populations to become aware of them prior to removal of the trees. A Bat Box Scheme of 50 woodcrete bat boxes is required and the bat boxes will be distributed within the CSZs identified for bats on suitable mature trees, or telegraph poles if the trees are not suitable. If trees, proposed to be felled and have a PBR value are located outside the CSZ with bat boxes, then additional bat boxes will be required
 - Bat boxes will be erected at locations to be instructed by the ECoW (and in consultation with a bat specialist), spread out across the Proposed Project, while bat boxes will be required in vicinity of the location of PBR 8 (two bat boxes, where feasible) and PBR 20 (four bat boxes, where feasible). Indicative locations are shown in the Environmental Masterplan (Figure 4.106 to Figure 4.184). It should be noted that multiple bat boxes will be erected at the chosen locations to ensure that a total of 50 bat boxes are in place. Seasonal inspections will take place for up to two years following installation

- Trees proposed to be removed will be felled on mild days during the autumn months of September, October or November or spring months of February and March (felling during the spring or autumn months avoids the periods when the bats are most active or in hibernation). However, the bird nesting season starts on 1 March and therefore March should be avoided in relation to felling
- An assessment of trees according to their PBR value determines the methodology of felling. Trees with PBR Category 1 are highly suitable for roosting bats and require more intensive procedures prior to felling. The trees identified within the study area are PBR Category 1, 2, and 3. The procedure to fell these is as follows:
 - Category 1: Trees with roosting features (e.g. dead wood, tree holes) will be checked prior to felling. All roosting features will be physically checked (using an endoscope and high-power torch) or where required dusk surveys will be completed to determine if bats are roosting within. A tree felling plan will be required in consultation with the tree surgeons. At least one bat box will be erected prior to the felling of each tree. The bat box will be installed in consultation with a bat specialist and will be located in areas where bats are known to forage or adjacent to suitable foraging areas. The bat boxes will also be located away from prevailing winds and away from lighting. Any trees showing crevices, hollows, etc., will be removed while a bat specialist is present to deal with any bats found. Such animals will be retained in a box until dusk and released on-site. Large mature trees will be felled carefully, essentially by gradual dismantling by tree surgeons, under supervision of a bat specialist. Care will be taken when removing branches as removal of loads may cause cracks or crevices to close, crushing any animals within.
 - Category 2 and 3: Any ivy-covered trees which require felling will be left to lie for 24 hours after cutting to allow any bats beneath the cover to escape.

8.8.2.2.5 *Vegetation Replanting*

979. Vegetation replanting, as detailed in Section 8.8.2.1, will be aimed at increasing species diversity which will help support more insect life and therefore prey for bats.
980. Proposed landscape planting will address the potential impact of gaps by planting new linear habitat features. In areas where gaps are considered to be problematic for specific species of bats (e.g. lesser horseshoe bats), fast growing tree species such as alder, birch and willow will be planted to provide tall vegetation for commuting bats. These areas are shown in the Environmental Masterplan (Figure 4.106 to Figure 4.184).
981. In areas where the removal of linear habitats may impact on the flight lines of local bat populations, temporary screens will be required to provide alternative commuting paths until new planting is sufficient in height. Temporary screens will also be required in areas where outdoor lighting is proposed to facilitate works (particularly along rivers and other water bodies) in order to prevent such lighting spilling on dark commuting zones. In addition, temporary screens will be required within the 2km CSZ for lesser horseshoe bat, as this species is particularly sensitive to the loss of linear habitats in the landscape as it relies on such to navigate from the roost to its preferred foraging area.

8.8.2.2.6 *Alternative Bat Roosts*

982. The Proposed Project would result in the loss of five confirmed roosts. Marnell *et al.* (2022) guidelines recommend specific mitigation requirements depending on the type of roost and bat species recorded roosting, to ensure bats are able to access alternative resting places at the earliest opportunity.
983. Given the need to remove five roosts and the impacts on bats that are predicted for the Proposed Project, a derogation licence under Section 54 of S.I. 477 of 2011 will be required. The Bat Derogation Licence application is included in Appendix A8.24.

984. The proposed construction works would result in the loss of a lesser horseshoe bat night roost and Natterer's bat/brown long-eared bat daytime roost within a derelict building (Building 1), as well one soprano pipistrelle day roost at the RWI&PS site and three tree roosts (day and satellite) for Natterer's bat and common and soprano pipistrelles. According to Figure 20 of Marnell *et al.* (2022) the roost in Building 1 and PBR 8 would have a status of '*Small numbers of rarer species. Not a maternity site*'. Conservation significance is deemed at a Medium Level. The guidelines dictate the provision of new roost facilities where possible. These need not be exactly like-for-like, but will be suitable, based on species' requirements. Minimal timing constraints or monitoring are required. While the assessment for proportionate mitigation is less for soprano pipistrelle bats and common pipistrelles because they are a common bat species, the provision of an alternative roost for lesser horseshoe bats will be the priority, but with consideration for all other bat species recorded roosting in Building 1 (Natterer's bat and brown long-eared bat) and Tree C (soprano pipistrelle). This will be in the form of a bat house. Bat boxes will be erected as alternative roosts for PBR 8 and PBR 20 (common pipistrelle and soprano pipistrelle roosts).
985. The locations of the building roost (Building 1) and tree roost (Tree C) in question are in Incha Beg and Parteen Woodland, respectively. A bat house will be constructed at a location where the structure will be protected from construction works and where landscaping can be undertaken around the bat house; and to provide additional linear habitat features to connect the planting to existing linear habitats in the immediate area. A single bat house will be designed principally for lesser horseshoe bats but will also consist of bat tubes that will provide alternative roosting for Natterer's bats, brown long-eared bats and soprano pipistrelles. The bat house will be located in a section of land set aside for biodiversity measures to the north-east of where Building 1 is located, adjacent to the WTP (Appendix A8.9: Bat Surveys Report). The bat house will be located in the top corner of the field, adjacent to the existing linear habitat, in order to allow new planting to be undertaken around the bat house and link with the existing linear habitats. As this field is sloping towards the topmost corner of the field, it will be important to locate the bat house and new planting in a position that wet ground will not cause management issues in the future. This location will provide direct access, for roosting bats, to preferred commuting and foraging habitat.
986. The alternative bat roost (one bat house) will be constructed one year prior to tree felling and building removal.
987. Marnell *et al.* (2022) and Schofield (2008; 2025) are used to design alternative bat roosting structures for lesser horseshoe bats with roosting provisions for soprano pipistrelles.
988. The following principles will be followed:
- The new roost will be located as close as possible to the existing roosts
 - The location of the alternative roost will be placed close to existing flight lines and foraging habitat to increase its success
 - The design should take into consideration the requirements of the species concerned
 - The alternative roost will be designed to provide suitable thermal regimes
 - Opportunities will be taken to provide a variety of roosting opportunities and thermal regimes so as to maximise the value of the structure for bats. This will be completed in relation to the ecological requirements for soprano pipistrelles.
989. Internally within the alternative bat house, the following will be implemented (refer to Appendix A8.9 (Bat Surveys Report) for further information):
- The floor of the building will be a layer of crushed stone (2 or 3 inches down) (minimum use of concrete is recommended in order to reduce the negative impact of this material on the thermal conditions of the building) with an upper layer of 804 Clause (crushed) stone

- A partition box will be required to be constructed (marine ply) around the entrance point to reduce light penetrating the loft space. This will be open at the bottom of the box so the bats can enter the box and fly down. The box will be at least 75cm²
- Internal loft floor with loft floor opening of 50cm x 50cm (to allow bats to fly from post box entrances into the loft space internally). This loft floor opening will be positioned in the centre of the floor. This opening will not have a trap door
- Internal wall will be a solid concrete block wall, not plastered.

990. Additional Roosting on the Bat House:

- Internal Walls
- Hang two units of Integrated Woodstone Bat Boxes on the wall along the wall late of the ground floor section, as high as possible (refer to Appendix A8.9 (Bat Surveys Report) for further information).

991. The establishment of the Bat House will be undertaken in consultation with a bat specialist to ensure the works are completed correctly and that the location of the bat roost is appropriate.

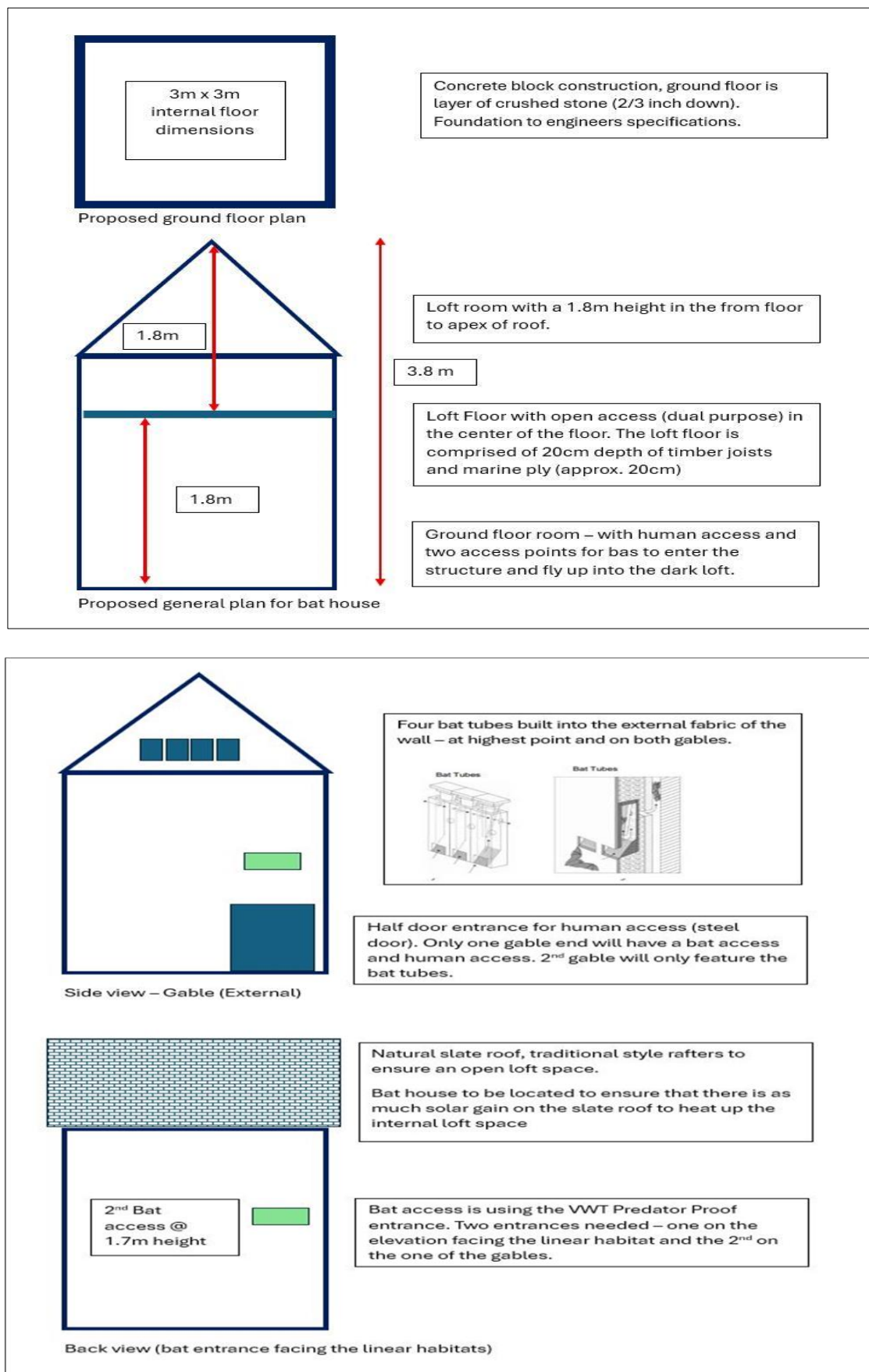


Image 8.2: Drawing of Proposed Alternative Bat House (Not Drawn to Scale)

992. Landscaping components:

- A native hedgerow will be planted around the boundary of the bat house, 5m from the external wall of the bat house. This will be a double row planted hedgerow of hawthorn and alder whips. Whips of alder will provide a fast-growing hedge that will be approximately 1.5m within one to two growing seasons. This will be planted as follows (keep repeating until entire linear boundary is planted):
 - 6x60cm hawthorn whips – planted 45cm apart but in double row, staggered
 - 1xalder 90cm whip – planted 60cm from hawthorn whips
 - 6x60cm hawthorn whips – planted 45cm apart but in double row, staggered
 - 1xalder 90cm whip – planted 60cm from hawthorn whips
 - 6x60cm hawthorn whips – planted 45cm apart but in double row, staggered.

993. In addition, to the bat house, a total of 50 summer bat boxes (Schwegler Woodcrete 1FF bat box or equivalent) will be erected. Bat boxes will be used to mitigate for the loss of PBRs proposed to be felled as well as general bat conservation measures. The bat boxes will be located within CSZs where suitable mature trees are available to erect bat boxes on. The bat boxes will be erected six months prior to any tree felling (please refer to Appendix A8.9 (Bat Surveys Report) for further information).

994. The specific bat box type for each species is detailed in Table 8.93.

995. Bat boxes will be sited carefully and will be undertaken by a bat specialist. The bat specialist will erect the bat boxes with assistance from the appointed Contractor. Some general points that will be implemented, include:

- Straight limb trees (or telegraph pole) with no crowding branches or other obstructions for at least 1m above and below position of bat box
- Diameter of tree will be wide and strong enough to hold the required number of boxes
- Locate bat boxes in areas where bats are known to forage or adjacent to suitable foraging areas. Locations will be sheltered from prevailing winds
- Bat boxes will be erected at a height of 4m to 5m to reduce the potential of vandalism and predation of resident bats
- Locations for bat boxes will be selected to ensure that the lighting plan for the proposed site does not impact on the bat boxes. Therefore, the bat boxes will be erected on mature trees located in the field adjacent to the bat roost that is to be removed.

996. Bat boxes will be erected under the supervision of a bat specialist. Seasonal inspection of bat boxes will be undertaken for a minimum of two years (excluding mid-June to mid-August, the lactation period of females, when any disturbance can be detrimental to the survival of young) to monitor bat usage and in wintertime for general wear and tear and to remove droppings following use the previous summer. This will be undertaken by a licensed bat-handler.

Table 8.93: Recommended Bat Boxes for Different Species

Bat species	Bat Box Type (Schwegler models)		
	Maternity	Summer (Non-breeding)	Hibernation
Common pipistrelle	1FF	1FF/2FN	1FF
Soprano pipistrelle	1FF	1FF/2FN	1FF
Leisler's bat	2FN	2FN	2FN
Brown long-eared bat	2FN	2FN	—
Daubenton's bat	2FN	2FN	—

Bat species	Bat Box Type (Schwegler models)		
	Maternity	Summer (Non-breeding)	Hibernation
Natterer's bat	2FN	—	—
Whiskered bat	2FN	2FN	—
Nathusius' pipistrelle	2FN	2FN	—

Note: Gaps in table indicate a lack of data on these species

8.8.2.2.7 Lighting and Noise

997. Lighting used during construction works can create a barrier for commuting or foraging bats (Kelleher and Marnell 2006; NRA 2006a; Stone 2013; Rowse *et al.* 2015; Rydell *et al.* 2017). Lighting in the Zol of a roost can cause a delay in emergence, leading to less feeding time and even roost abandonment. Therefore, lighting within the Proposed Project will be restricted in areas of high bat activity or near confirmed/potential roosting sites. Where lighting is essential (Health and Safety purposes only), the overspill of light will be minimised through directional lighting and aimed directly onto the works and not the wider landscape, so as to leave some unilluminated areas in which bats can still commute. This will 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. Lighting will be restricted to working hours, with no lights directed towards any confirmed/potential roost, and will not be used near identified important commuting corridors and foraging areas. A bat specialist will check the lighting pattern once assembled and will make recommendations regarding perimeter lux levels.
998. Watercourses are commonly used as commuting corridors by bats and are an essential foraging area for the Daubenton's bat. In areas where open trench or trenchless construction of watercourses is proposed (Section 8.5.3.1.1), vegetation within the riparian zone may be temporarily removed. Construction of the watercourse crossings is likely to take place between March and September (Section 8.8.3), therefore, in order to minimise disturbance such as lighting and noise (Stone 2013; Luo *et al.* 2015) to foraging or commuting bats, works will cease at sunset. Replanting of riparian habitats will commence once works have been completed in an area.
999. Anthropogenic noise affects bats in a number of ways, namely noise avoidance, a reduction of echolocation effectiveness, and/or reduced attention (Luo *et al.* 2015). Where construction is taking place in close proximity to a known roost or an important commuting corridor or foraging area, works will cease before sunset so that construction noise will be reduced to ensure normal usage of the landscape by bats. In addition, or where night-time work is proposed, the following mitigation measures will be implemented to prevent or reduce noise effects on bats:
- The appointed Contractor undertaking the construction works will be obliged to take specific noise abatement measures where necessary and comply with the recommendations of BS 5228-1 (BSI 2014b) and the Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (NRA 2014b)
 - 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/m². The minimum height of the barrier will be such that no part of the noise source will be visible from the receiving point
 - Lower noise generating equipment, that will provide the required structural/excavation/breaking results, will be selected to reduce potential disturbance
 - Mobile and stationary plant will be switched off when not in use and not left idling (e.g. engines, motors, generators)

- Mobile temporary screens will be used where works are taking place in close proximity to a known roost or an important commuting corridor or foraging area
- Site hoarding will be used around construction site compounds along noise-sensitive boundaries.

8.8.2.3 Mammals – Eurasian Badger

1000. As the usage of setts by badger can change over time, in order to assess the status of existing badger setts and any newly established setts in advance of construction commencing, a pre-construction survey will be conducted along suitable habitats (e.g. woody vegetation) within the Proposed Project, no more than 10 to 12 months in advance of construction (NRA 2006d). The survey will be supplemented by a further inspection of the development area immediately prior to site clearance. The findings of these surveys will inform site clearance activities.

1001. The mitigation measures described below, as they relate to each of the badger setts within the Zol of the Proposed Project, follow the recommendations set out in the Guidelines for the Treatment of Badgers during the Construction of National Road Schemes (NRA 2006d). It should be noted; badger do not qualify for an Application for Derogation under the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) (as amended).

1002. A total of 166 badger setts were identified within the Zol of the Proposed Project (i.e. setts located within 30m and 50m of the Proposed Project and setts located within 150m of pile-driving activities). In order to prevent any disturbance to badger setts not directly affected by the Proposed Project, no construction machinery will be used within 30m of badger setts (extended to 50m for active setts during the breeding season, December to June inclusive). Pile-driving (at the RWI&PS and in some peat areas, as outlined in Appendix A5.3: Working in Peat) will not be undertaken within 150m of active setts during the breeding season. In unavoidable circumstances, works closer to active setts may take place during the breeding season provided appropriate mitigation measures, in line with guidelines, are in place (e.g. sett screening, restricted working hours). During the pre-construction survey, any new setts identified adjacent/close to the Proposed Project (within 50m) will be marked and the area from which vehicles are prohibited will also be clearly marked by timber post and rail fencing (and appropriate signage) which will allow badgers to move in and out freely. Such marker fencing will be sufficiently durable and robust to cover the period of construction. To ensure that accidental damage to setts does not occur, there will be a transfer of information between construction personnel at all levels. The mitigation measures and procedures required in relation to badgers, outlined herein, have been included in the CEMP (Appendix A5.1) prepared for the Proposed Project:

- A 30m buffer (extended to 50m for active setts during the breeding season) will be marked out around the setts, using barrier tape. Where any works are planned in the Zol of these exclusion zones (or where they could encroach into the zone) an ECoW will be contacted prior to any such works. The ECoW will ensure that the appointed Contractor(s) is complying with the mitigation measures outlined herein
- Night-time working will be restricted as far as practicable within 150m of a sett. As badgers are nocturnal, disturbance will be reduced by restricting the amount of night-time working within the Zol of a sett. Night-time, in terms of badger nocturnal activity, is defined as beginning one hour before sunset and lasting to one hour after sunrise
- The use of noisy construction machinery in the Zol of badger setts will cease before sunset. Excavations will either be covered (with plywood), fenced or have an escape ramp installed overnight to prevent badgers, or other wildlife, from falling into them and becoming trapped
- Pile-driving works will not be undertaken within 150m of a sett during the breeding season (December to June inclusive) and instead will be undertaken outside of this time.
- Any spoil heaps will be sited at a minimum distance of 30m from setts
- Chemicals will not be used within 30m of a badger sett

- Mammal-proof fencing to be installed in the Zol of a sett to exclude badgers will be hand-dug under supervision. Regular monitoring of mammal-proof fencing will be undertaken by the ECoW to determine any possible defects, gaps and/or weaknesses.

1003. The location of any spoil heaps or other additional site usage during clearance and construction will avoid any disturbance to the location of active badger setts. Landscaping activities after the Proposed Project Construction Phase can also affect badger setts, and care will be taken to ensure that setts are safeguarded on or near the site and are not interfered with at this stage and that access to foraging areas is not restricted.

1004. Where the destruction of active badger setts cannot be avoided exclusion and destruction will be carried out under the supervision of an appropriately qualified ECoW. It is anticipated that 33 badger setts would be destroyed to facilitate the Proposed Project (refer to Table 8.36). Evacuation and destruction will be undertaken between 1 July to 30 November (outside of the breeding season). Exclusion of badgers from disused or currently inactive setts is not seasonally restricted and can be conducted at any time under the supervision of a suitably qualified and experienced ECoW. In accordance with NRA (2006d) guidelines, which are considered best practice, where pre-construction surveys confirm the destruction of a significant (e.g. main) sett will be required, and no suitable alternative natural setts are present, the construction of an artificial sett may be recommended as an alternative to mitigate for the loss. Thus, 24 artificial setts are proposed to mitigate for the loss of significant setts where no suitable natural setts/alternatives were recorded in the surrounding area. The artificial setts, as shown in the Environmental Masterplan (Figure 4.106 to Figure 4.184), will be established in close proximity to existing setts. The artificial sett will be constructed at least 6 months prior to exclusion. The construction and location of potential artificial setts will be agreed in advance with the NPWS and the DAFM Local Veterinary Office. A suitably qualified ECoW will oversee the process from the start, i.e. from design to installation. A period of monitoring will be required in order to determine use of the artificial sett by badgers. The duration and frequency of monitoring will be site-specific, depending on when and if badgers colonise, and will be agreed with the ECoW. The construction of an artificial sett will follow SNH Guidance for the Creation of Artificial Setts (SNH 2018).

- Badger setts requiring exclusion and removal will require a monitoring period of at least five days prior to any construction works commencing in order to confirm activity status. If the sett is active, then it will not be removed within the badger breeding season (December to June inclusive). To exclude or remove an active badger sett outside of this period, inactive entrances will be soft and hard-blocked with one-way gates installed on active entrances. One-way gates will be tied open for three days before being set to exclude, and then monitored for a period of at least 21 days before the sett is deemed inactive and destroyed immediately following the 21-day period. If at any time during the monitoring period the sett becomes active, the exclusion process/programme must commence again from day one of the 21-day monitoring period. For inactive setts, entrances will be soft-blocked (lightly blocked with vegetation and soil) and if all entrances remain undisturbed for a period of five days the sett will be destroyed immediately. This can be undertaken at any time of the year for inactive setts
- Destruction of a successfully evacuated badger sett will only be carried out under the supervision of a suitably qualified and experienced ECoW. The possibility of badgers remaining within a sett will always be considered. Destruction of a sett will commence 25m from the outer sett entrances and working towards the centre cutting 0.5m slices in a trench to a depth of 2m. Exposed tunnels will be checked for badger activity. The sett will be destroyed from several directions until the core sett remains. Once it is determined that no badgers remain, the core of the sett will be destroyed and the entire area backfilled. This work will be completed within one working day, as badgers may enter exposed tunnels.

8.8.2.4 Mammals – Otter

1005. Otter signs and holts were recorded throughout the study area of the Proposed Project (Section 8.3.2.4.1). Otters are likely to use all larger watercourses crossed by the Proposed Project, including Nenagh River, Little Brosna River, Camcor River, Silver River, Clodiagh River, Figile River, Grand Canal and the River Liffey. In addition, Parteen Basin supports suitable otter feeding and commuting habitat and is designated as a European site for otter, among other qualifying interests.
1006. Otter field signs were generally located in riparian zones, close to the Proposed Project watercourse crossing points, as would be expected based on the known habitat preference for this species. However, otters do not limit their movements to watercourses and can enter hinterlands to search for prey species, such as frogs and newts where available. Confirmatory pre-construction surveys for otter (resting or breeding places) will be undertaken prior to the commencement of any works in order to identify any changes in otter activity or holt/couch locations/status and to verify the mitigation, as outlined herein, that is to be implemented. Pre-construction surveys will be conducted no more than 10-12 months in advance of construction, as per the NRA guidelines (2008a).
1007. Three otter holts were recorded within the Proposed Project. Two holts were found to be active while the third was recorded as inactive. Although all three otter holts are located within the confines of the Proposed Project, destruction of the holts will not be required as they are set back from proposed infrastructure/works.
1008. No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding, otter holts (NRA 2008a). Light work, such as digging by hand or scrub clearance will also not take place within 15m of such holts, except under licence. The prohibited working area associated with otter holts will be fenced and appropriate signage erected.
1009. In accordance with NRA (2008a) guidelines, no works will be undertaken within 150m of any holts at which breeding females or cubs are present. Following consultation with NPWS, works closer to such breeding holts may take place provided appropriate mitigation measures are in place, e.g. screening/hoarding. This is likely to be the case for holts located within the Proposed Project boundary (refer to Table 8.38) and therefore an Otter Derogation Licence application has been sought from NPWS for the disturbance of the three holts and is included in Appendix A8.25.
1010. In the event that new otter holts are identified within the ZOI of the Proposed Project during the pre-construction surveys, new otter derogation license(s) will be sought from NPWS and the mitigation measures outlined herein will be implemented.
1011. For active holts, otters will be evacuated from the holts prior to any closures. 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. 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.
1012. 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 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 Otter Derogation Licence.

1013. In accordance with NRA (2008a) guidelines, where pre-construction surveys confirm the destruction of an active breeding holt will be required, and no suitable alternative natural holts are present, the construction of an artificial holt may be recommended as an alternative to mitigate for the loss. Artificial holt(s) will be constructed prior to exclusion of an active holt. The artificial holt will be established in close proximity to the existing holt. The construction and location of a potential artificial holt will be agreed in advance under licence with the NPWS. A suitably qualified ECoW will oversee the process from the start, i.e. from design to installation. A period of monitoring will be required in order to determine use of the artificial holt by otters. The duration and frequency of monitoring will be site-specific, depending on when and if otter colonise, and will be agreed with the ECoW. The construction of an artificial holt will either avail of pre-constructed holts purchased from UK companies or create a holt from a variety of available designs that have been approved by the NPWS.
1014. 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 2008a).

8.8.2.5 Mammals – Other Mammal Species

1015. There is no known method for excluding pine marten, pygmy shrew or hedgehog from breeding/nest sites and therefore the seasonal clearance of vegetation for breeding birds (1 March to 31 August) will be implemented as far as practicable. The seasonal clearance of vegetation for breeding birds coincides with the breeding season for these protected mammals. This mitigation will simultaneously avoid the majority of the main breeding season for most small mammal species (Hayden & Harrington 2001).
1016. 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 in advance in order to determine whether any protected fauna are present. If any are encountered, the vegetation clearance will be delayed until the protected fauna have moved away from the area, e.g. when a nest has been abandoned.
1017. In addition, considering hedgehogs hibernate over winter typically under log piles or tree roots or within dense vegetation and scrub, if construction works are undertaken during winter months, such vegetation or potential nests at risk of disturbance or removal will be inspected by an ECoW for the presence of hibernating hedgehog prior to any removal. If any are encountered, the vegetation clearance will be delayed until they have moved away from the area.

8.8.2.6 Invertebrates

1018. With regard to marsh fritillary, the key mitigation measure employed was avoidance through careful route selection. Where devil's-bit scabious was recorded, other factors such as sward height generally made the site unsuitable for breeding marsh fritillary. However, where feasible, these pockets of devil's-bit scabious will be retained and fencing will be used to protect them from construction activities to provide long-term opportunities for colonisation. All areas within the Proposed Project where marsh fritillary was recorded during baseline surveys, as well as area identified as suitable habitat to support the marsh fritillary (refer to Environmental Masterplan in Figure 4.106 to Figure 4.184) will be subject to a pre-construction larval web survey by an ECoW. This will be undertaken during the mid-August to the end of September window, immediately preceding site clearance works. If larval webs are present, they will be translocated to an alternative suitable habitat within the Proposed Project that can be fenced off and

avoided by construction works. Once all larval webs have been removed from the affected areas, or if no larval webs were recorded, the vegetation will be immediately cleared or cut to ground level to render the area unsuitable for the species to recolonise. The vegetation will be maintained in this state until such time as the topsoil is removed.

1019. With regards to mollusc species, namely Lilljeborg's whorl snail and brown snail which were recorded at the RWI&PS site, it is proposed these species will be collected and transferred to alternative suitable habitat outside of the working area in advance of construction. Brown snail has a very fragile shell, therefore these snails will be collected by hand (rather than sweep netting) from the areas where it is present within the RWI&PS site. A suitable receiving site outside of the working area (deciduous woodland with similar lush grassy marginal areas or woodland rides) is shown in the Environmental Masterplan (Figure 4.106 to Figure 4.184). Monitoring will be carried out to check for the presence of this snail prior to releasing collected specimens, and then sampling of the recipient site after three and six years to gather information on the success of the introduction. For Lilljeborg's whorl snail, a thorough search of the shoreline that would be impacted by the RWI&PS will be undertaken by hand searching and sweep netting prior to construction works commencing. Any snails found will be translocated to an alternative location with similar habitat outside of the working area. No ongoing monitoring of this snail is proposed due to the difficulties of finding it.

8.8.2.7 Other Species Group – Reptiles and Amphibians

1020. In order to protect the common frog, a pre-construction survey will be undertaken if construction works are to be carried out between January to July (i.e. their breeding season). The pre-construction survey will be carried out where frogspawn/tadpoles were recorded (Figure 8.109 to Figure 8.212) and in suitable breeding habitats identified within the Proposed Project (FL8, FW4, GS4, HH3, PB1, PF2, WN5 WN7; Figure 8.4 to Figure 8.108) to determine whether breeding frogs are present. In the case of common frog, any frog spawn, tadpoles, juveniles or adult frogs found present will be removed by hand net and translocated to the nearest available unaffected habitat within the Proposed Project that is suitable, under licence from the NPWS.

1021. Similarly, in the case of smooth newt, a pre-construction survey will be undertaken if construction works are to be undertaken between February to June (i.e. their breeding season). The pre-construction survey will be carried out where smooth newt/eggs/larval were recorded (Figure 8.109 to Figure 8.212) and in suitable breeding habitats identified within the Proposed Project (FL8, FW4, PF2; Figure 8.4 to Figure 8.108) to determine whether breeding newts are present. Individuals will be captured and removed from affected habitat either by hand net or by trapping and translocated to the nearest area of available suitable habitat within the Proposed Project that is unaffected. If used, the type and design of traps will be approved by the NPWS. This is a standard and proven method of catching and translocating smooth newt.

1022. If the size or depth of the habitat feature is such that it cannot be determined whether all amphibians have been captured, it will be drained under the supervision of a suitably experienced ECoW to confirm that no amphibian species remain before it is destroyed or infilled. Any mechanical pumps used to drain the habitat feature will have a screen fitted, and be sited, such that no amphibian species can be sucked into the pump mechanism. Any capture and translocation works will be undertaken immediately in advance of site clearance/construction works commencing.

1023. Given the broad range of habitat types favoured by the common lizard, and that the Proposed Project passes through mosaics of such habitats, site clearance works at any time of year in suitable habitat are likely to encounter the species. To minimise the risk of site clearance and construction works disturbing, or causing the mortality of common lizard, in suitable habitats where common lizard has been confirmed during pre-construction surveys, the grass, scrub or heath vegetation will be removed during the winter period, where reasonably practicable, avoiding potential common lizard hibernacula sites (dry sites which

provide frost-free conditions e.g. stone walls, underground small mammal burrows, piles of dead wood or rubble). Where this is not practicable and clearance will be undertaken during the active season (March through to September, inclusive), vegetation will be cut first to approximately 15cm, and then to the ground, under supervision of an ECoW to allow the opportunity for lizards to leave the affected area. Stone walls (or other potential hibernacula sites) will be removed during the active season (March through to September, inclusive) under the supervision of an ECoW.

8.8.3 Aquatic Ecology

1024.A Surface Water Management Plan (SWMP) has been prepared and contains details on the proposed crossing methodologies (Annex A of Appendix A5.1: CEMP). In advance of any works taking place, the CEMP (including SWMP) will be distributed and discussed with all parties involved in the construction of the Proposed Project (including any sub-contractors) in order to protect aquatic conservation interests within the Zol. The SWMP sets out measures to avoid siltation, erosion, surface water runoff and accidental pollution events which all have the potential to negatively impact water quality within the Proposed Project during the Construction Phase.

1025.All surface water works will be carried out in accordance with the mitigation measures detailed herein, which align with the Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), or as otherwise agreed with IFI during the Construction Phase. Mitigation measures will be monitored by a suitably qualified ECoW on a daily basis to ensure compliance and maintenance of any attenuation and sediment and erosion control measures (e.g. hydrocarbon interceptors and silt traps) are carried out as required. All measures provided for the protection of aquatic ecology and fisheries within the Proposed Project, in addition to the mitigation measures for water quality protection (Chapter 9: Water), will effectively protect aquatic ecological interests downstream of the Proposed Project.

8.8.3.1 Mitigation Measures to Reduce the Potential for Impacts to Aquatic Species, Habitats, and Water Quality

1026.For watercourses within or adjacent to the Proposed Project, but not crossed by the Proposed Project, construction works will be set back and a buffer zone will be put in place between silt traps and watercourses, with the natural vegetation left intact. Where feasible, the buffer zone for larger river channels (>10m width) will be 35m to 60m and for smaller channels (<10m width) will be 20m or greater, as per the recommendation in the 'Planning for Watercourses in the Urban Environment' (IFI 2020), or as otherwise agreed with IFI during the Construction Phase. These buffers will be clearly marked in the field with signs and/or highly visible flagging until construction-related ground-disturbing activities are complete.

1027.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 (NRA 2008b). 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.

1028.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.

1029. The following measures will be put in place by the appointed Contractor across the entire Proposed Project with regard to stockpiling of material:

- Temporary stockpiles will be located away from drains and watercourses being crossed. 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
- Management of stockpiles to prevent siltation of watercourse systems through runoff during rainstorms will be required and 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 a 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.

1030. Silt control measures are proposed at locations where works are to take place in close proximity to water bodies and drains. The measures are informed by the type of works proposed, the sensitivity of the habitat and the proposed access track. The following are the general requirements which will be adhered to for silt control:

- Access route drawings and instructions issued by client will be referred to
- Damage or disturbance to the ground will be avoided in the first instance
- The weather forecast will be checked daily
- Activities will be planned in advance to avoid tracking across a piece of ground more than necessary
- Tracking directly beside streams and ditches will be avoided where practicable so as to not cause damage to the bankside
- Bog mats will be used if the ground conditions are poor and it is practicable to do so
- If ground conditions are poor, the following measures will be considered:
 - Wait for dry weather and better ground conditions to access the site
 - Seek advice of ESNB engineers, ECoW and other specialists
 - Install silt fences and silt traps before any site works commence
 - Survey the ground to see where water would flow.

1031. Where works are to be undertaken adjacent to water bodies, potential for pollution-sourced impacts to close-lying surface water features and their aquatic species may exist. In such instances the installation of silt fences or silt traps are proposed under the supervision of the ECoW. Silt traps and silt fences will be constructed using a permeable filter fabric (Hy-Tex Terrastop Premium silt fence or similar) designed to intercept runoff, trapping silt through a settlement and filtration process before it leaves the site.
1032. Silt traps will only be placed downstream of working areas to prevent sediment entering a watercourse further downstream. The purpose of the trap is to reduce the level of solids in the slowly flowing water. Silt traps will be constructed using a permeable filter fabric and not mesh. The trap will be staked into the banks of the drain such that no water can flow around the sides. The material will be bedded into the drain bed to prevent water flowing beneath it. The height of the trap will be lower than the drain bank heights. The upper edge will be fixed to a timber cross piece. This will allow water to overtop the silt trap and not burst through or around it. The trap works by allowing a build-up of water behind it slowing flow and allowing solids to settle out.
1033. Where necessary, silt fencing will be installed as follows:
- Silt fences will be installed downslope of an area where silt is being generated on disturbed ground
 - To be effective, the silt curtain will contain the area where silt is generated and will terminate on high ground
 - Silt fences will be constructed using a permeable filter fabric (Hy-Tex Terrastop Premium silt fence or similar) and not a mesh
 - The base of the silt fence will be bedded at least 15cm to 30cm into the ground and staked at 2m intervals
 - The vegetated sod will be peeled back without detaching from the ground, the geotextile inserted, and sod restored to hold the base in place
 - Silt fences will be maintained until vegetation on the disturbed ground has re-established.
1034. Silt fencing for the process of replacement of fittings, works, cross arms, and conductors during the 38 kV Uprate Works, is not proposed as the risk of ground disturbance is considered very low and the ground disturbance associated with installing the silt fence may be greater. Inspections of silt traps and fencing will be carried out daily during construction. Construction materials for the 38 kV Uprate Works will be stored at the ESNB Depot on Rosbrien Road prior to transfer to the required locations on an as-needed basis. Poles and other materials will be stored and handled appropriately prior to transfer to the required locations.
1035. In relation to the 38 kV Uprate Works, the time period over which excavations are left open will be reduced insofar as is reasonably practicable. Impermeable coverings will be provided for use to cover excavations overnight and in the event of heavy rainfall during working hours. Surface water runoff at the 38 kV poleset foundations and cable trenches will be managed to prevent flow of silt-laden surface water flowing into surface water receptors. If dewatering of a foundation or trench is required to manage groundwater, this will be discharged to a sedimentation tank first and where feasible the settled water will be allowed to soakaway to land.

8.8.3.1.1 Construction Activities at the RWI&PS

1036. At the RWI&PS site at Parteen Basin, a temporary piling platform and secant piles will be necessary to allow work on the intake structure and below-ground sections of the Raw Water Pumping Station Building to proceed in dry conditions, below the prevailing water level outside 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 auger 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 RWPS substructure can be constructed. A detailed description of the installation of the secant pile walls is provided in Chapter 5 (Construction & Commissioning).

1037. 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. $\leq 25\text{mg/L}$ total suspended solids in accordance with the Quality of Salmonid Waters Regulations (1988)).
1038. As discussed in Chapter 9 (Water), 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. Oil, bilge water and sewage will be contained within the barge itself and disposed of at appropriately licensed sites. The mitigation measures, taken to avoid or reduce impacts on water quality as a result of the barge (Chapter 9: Water), will in turn ensure the Proposed Project does not result in a likely significant negative effect on aquatic ecology, at any geographic scale.
1039. 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.
1040. Concrete revetment mats (a flexible mat of meshed thin concrete segments with voids) will be threaded by non-corroding heavy duty nylon rope and lifted into place by a crane and lifting bracket. It 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 fauna once construction is complete. The area of disturbance of the water body bed and bank would be the absolute minimum required for the installation of the temporary piling platform and secant piles.
1041. 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.

1042. 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.

1043. The intention is that the works can be sequenced to reduce the dependency on the double silt curtain as follows:

- Install double silt curtain around the working area as part of site mobilisation
- Install temporary sheet piling to retain the temporary piling platform (this would be on both sides of the piling platform and must form a continuous barrier around the temporary works at the intake)
- The silt curtain would be used to manage silt during the temporary sheet piling; however, the piling platform becomes the primary silt retention barrier with the two silt curtains providing back-up during the secant piling and all constructions works required for the intake and pumping station (except for the installation of the rock revetment)
- When the temporary works on the 'wet side' of the intake are completed the piling platform would be removed. During this phase the silt curtains act as the primary containment measure
- In preparation for the dredging and placement of rock revetment a physical barrier consisting of a silt curtain or a structure performing an equivalent function would be placed around, and close to the perimeter of the dredging / rock revetment area. This provides the primary containment, and the double silt curtain provides the back-up.

1044. Once the revetment had been completed and all works on site completed the double silt curtain can be removed.

1045. 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 Zol 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).

1046. 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 can swim away without being trapped/held by the screen. The maximum flow of 300Mld equates to 3.47m³/s. The intake is designed to pass the maximum flow through two out of the three screens, which works out at 1.74m³/s each. The surface area of each screen is 37m², so dividing the maximum flow of 1.74m³/s through each screen by the surface area (37m²) 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.
1047. An inspection and maintenance plan will be required to ensure the effectiveness of the silt curtains. Inspection of the screen and anchoring arrangement whilst deployed can best be undertaken through a diver survey. Inspection of the flotation arrangement will be carried out by boat. Turbidity monitors will be deployed downgradient of the proposed works. An Emergency Response Plan will be activated in the event of damage to the silt curtain. Relevant materials and equipment will be available to effect repairs to the silt curtain.
1048. Silt generated during construction works will be allowed sufficient settlement time within the water contained inside 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.
1049. Within the secant piles, continuous dewatering facilities will be provided until the ingress of water is controllable by pumping. Dewatering of all excavations will be required to ensure dry working conditions. The appointed Contractor will maintain pumps in any deep excavations, and these will pump water that enters the excavation into two lined Dewatering Settlement Basins. These dewatering flows will be pumped into Settlement Basins No. 1 and 2 in sequence (Chapter 5: Construction & Commissioning), where a hydrocarbon interceptor will be positioned between Basins 1 and 2. The retention time of water within the basins will be approximately 2.7hrs at a depth of 1.5m, or alternatively 3.6 hours at a 2m depth, allowing particles to settle. This capture of fine material will be further enhanced by filtering the water through fine mesh textile fabric before pumping the settled water back to the Parteen Basin. The capture of fine material and filtering of water will ensure that all settled water pumped back to Parteen Basin will be within the prescribed water quality limits (i.e. ≤25mg/L TSS in accordance with the Quality of Salmonid Waters Regulations (1988)). Routine water quality monitoring (as detailed in Appendix A5.1 Annex A (SWMP)) will be undertaken to ensure compliance with these regulations. The outfall from the basins will be via Basin No. 2 and pumped from a sump through the sheet pile above flood level. Once the construction of below-ground works is taken to ground level, design against buoyancy of partly completed works has been undertaken, and testing permits, then backfilling of the excavated area and sealing of the substructure will reduce the dewatering volume. The same settlement basins will also be used to accept runoff water discharging downgradient from the RWRM and trench.
1050. The surface water runoff at the RWI&PS will be managed to prevent silt-laden surface water flowing into water bodies. The appointed Contractor will construct temporary drainage measures to minimise risk of pollution during earthworks construction and other elements of work. Dewatering flows and site runoff will be taken through the settlement basins referenced in Chapter 5 (Construction & Commissioning). A temporary surface and groundwater sump pump will pump settled water back to Parteen Basin during the construction works. Upon completion of construction this sump will then be converted for use as a wastewater holding tank. Also, upon completion of construction the settlement basins will be converted to act as infiltration basins, taking surface water runoff from the completed site paved areas. Runoff from roofs will be drained to the inlet chambers of the raw water intake structure. Chemicals, fuels and other pollutants will be carefully stored in contained facilities. A refuelling area will not be permitted at the RWI&PS construction site but will instead be provided at the nearby WTP construction site.

8.8.3.1.2 *Trenchless Crossings*

1051. For watercourses crossed by the Proposed Project, the primary mitigation measure is the use of trenchless techniques. As noted, trenchless construction will be employed at 13 major watercourse crossings and/or watercourses considered to be of high freshwater ecological value (Appendix A8.14: Watercourse Crossing Data). This will protect rivers and streams and protected aquatic species (e.g. salmonids, lamprey, white-clawed crayfish) from the potential impacts of open-trench methods. During the construction process, natural flow paths will not be interrupted or diverted so as to give rise to or create potential erosion. There are still however, some risks associated with trenchless techniques; mitigation for these is outlined as follows:

- 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
- Groundwater will be managed as detailed in Section 8.8.2.1.2
- 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 through 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.

8.8.3.1.3 Open Trench Crossings

1052. 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.
1053. The natural path and flow of rivers or streams will not be permanently diverted or blocked and there will be no temporary or permanent dewatering of rivers or streams downstream of construction sites. Natural flow rates will be maintained in the channel at all times. Design and choice of temporary crossing structures will provide for passage of fish and macroinvertebrates, protect important fish habitats, and prevent erosion and sedimentation.
1054. A sediment mat/silt trap or similar will be located immediately downstream of the works within and adjacent to the watercourses in order to minimise silt loss. Double silt fencing will be installed as necessary. These will be inspected daily and maintained and cleaned as required during the course of construction works to ensure they are working effectively. Temporary sump pumps or flumes will be used to convey the water to downstream of the open excavation crossing point. 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. Water trapped by sandbags, which will be placed downstream of open-cut crossings, 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. The in-stream sediment control devices will be replaced as per the manufacturer's recommendations, with the mat closest to the works being removed and replaced first. Such drainage containment systems will also cater for spill containment.
1055. Prior to dewatering, all watercourses with fisheries potential will be electrofished (under licence) and fish will be placed upstream of works. In addition, a pre-commencement white-clawed crayfish survey will be undertaken at open cut crossing locations to ensure no crayfish occur within the works areas, and if present individuals will be trapped and translocated (under licence) to upstream of the works.
1056. In-stream works will not be carried out in watercourses frequented by salmon or trout during the annual close season and 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. In-stream works may be carried out between October and March if juvenile lamprey are translocated; however, the salmonid spawning season will still need to be considered. The duration of the season for salmonids varies regionally. In-stream works will take place under the direction of the ECoW. The timing of works will always be considered on a site-specific basis (typically works can be carried out during the period July to September) and in agreement with IFI, as some rivers have late spawning salmonids. Watercourses within the Proposed Project that have spawning habitat, salmonid, lamprey and/or crayfish potential and their proposed crossing methodology, can be seen in Table 8.42.
1057. Where applicable, and under the supervision of a suitably qualified ECoW, salmonid spawning gravels encountered (if any) will be removed at the stream crossing points prior to construction works taking place; subject to the prior agreement, at all stages, with IFI. Table 8.42 outlines the watercourse crossings where spawning habitat and spawning habitat potential was recorded. The spawning gravels (if any) will be stockpiled on geotextile filter fabric, clearly marked and taped off adjacent to the watercourse crossing, and will be used to reinstate the stream bed after the pipe has been installed and the damming/fluming materials have been removed. Additionally, where juvenile lamprey habitat is

encountered (fine sand/silt substrates) the same process will be applied where the habitat will be removed prior to construction and reinstated to the original profile (subject to prior agreement with IFI). All surfaces will be reinstated to the satisfaction of the landowner and re-seeded (with locally sourced appropriate native species) to assist soil stabilisation. A silt fence will be placed along the riverbank where the works were undertaken in order to prevent solids washed off the works area during heavy rainfall, entering the stream while the surface adequately re-vegetates. This measure will be particularly important at sites which slope to the edge of the watercourse. Following completion of backfilling, riverbed and banks will be reformed to match their original profile. 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 intervals and duration for the remedial works monitoring programme will be decided upon by the ECoW and are likely to depend upon the speed of habitat establishment and stabilisation. Where in-stream bed material is to be removed, coarse aggregates and spawning gravels, 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. All aquatic habitats found within the watercourse crossing locations will be reinstated to their original form using existing substrates to allow for natural regeneration; this includes all potential and existing KER habitats listed in Table 8.42.

1058. In addition to the replacement 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.

1059. The detailed design of works within the watercourses, particularly the reinstatement of watercourses following open-cut crossings, will be undertaken with input and guidance from a geomorphologist and a suitably qualified ECoW. The reinstatement of the channel cross-sections following the open trench crossings will include:

- Re-use of existing bed and bank material, placed in the same layers as removed from the trench
- Reinstatement of the channel bed and banks flush with the existing bed and banks to prevent preferential erosion
- Compacting of the bed and bank material sufficiently
- Planting of riparian vegetation to minimise erosion from runoff and bank destabilisation.

1060. If during the detailed design or construction stages it becomes necessary to culvert (CIRIA 2010) any watercourse (e.g. small drains), 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).

8.8.3.1.4 *Washout Valve Locations*

1061. 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 Phase
 - 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.

1062. During the abstraction of raw water for hydrostatic testing and commissioning, and subsequent discharge post testing and commissioning, in order to avoid/reduce significant effects on aquatic habitats, plant communities and protected fauna, 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 2,000m³/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 (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.

1063. 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.

1064. During 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 commissioning only) where necessary, in order to achieve this discharge standard. 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 would be reduced to below <0.005mg/L, as required by the Quality of Salmonid Waters Regulations (1988). All sweetening flow discharges would be monitored for chlorine residual, and de-chlorinated prior to entering any watercourse as part of the embedded design measures. Refer to Appendix A4.1 (Operational Strategy) for further details.

8.8.3.1.5 Use of Temporary and Permanent Bridges

1065. Temporary bridging (clear span, beam bridges or plate girder bridges, depending on the span of the crossing; Chapter 5: Construction & Commissioning) will be used to provide access for construction machinery across watercourses for the 38 kV Uprate Works. There is no requirement to provide temporary crossing infrastructure for the River Shannon or the Headrace Canal as existing public road crossings would be used throughout the works for these watercourses.

1066. Temporary bridges will be required for the duration of the works at three 38 kV Uprate water crossings lacking an existing crossing structure (three FW4). These locations are along the access track leading to polesets 100B, 101B and 102B (Figure 8.4 to Figure 8.11). Temporary bridging will also be required to span watercourse crossings and maintain the movement of construction traffic along the Construction Working Width of the Proposed Project.

1067. Temporary bridging will be transported to site by tracked excavator, tracked dumper or all-terrain vehicles via the agreed access tracks to the 38 kV Uprate Works crossing points or access routes to the Proposed Project. All construction personnel will be trained in the safe use of temporary bridging by the supervising ECoW and Site Engineer/Site Manager, prior to the commencement of construction. The appropriate length of bridging will be determined by the Site Engineer/Site Manager. All temporary bridge locations will require pre-construction verification by the supervising ECoW and Site Engineer/Site Manager, so that any modifications arising from planning conditions, and potentially also arising from changes in ground conditions, can be taken into account. Watercourse crossing method statements will be prepared and agreed with IFI.

1068. Temporary bridges would typically be modular flat-pack bridges (steel flooring panels) made specifically for this purpose. They are available in various lengths (max 12.6m including ramps and 3.5m wide) and can handle loads of up to 110 tonnes. Where longer spans are required to mitigate impact on a sensitive habitat, beam bridges will be deployed. These are modular units which can come pre-assembled and can accommodate spans up to 25m. Beam bridges are supported on concrete piers. The top of the pier is set to ensure sufficient clearance is maintained over the obstacle, such as a sensitive watercourse and riparian habitat. As this bridge would be above existing ground level, the approach to the bridges would be engineered ramps formed from construction materials being used on the works, including suitable excavated material extracted from the pipeline works and coarse stone. Suitable provision for a working area to accommodate a beam type bridge has been made at Breaghmore, County Offaly (WCX031). If the appointed Contractor requires spans greater than can be provided by a beam bridge, then plate girder bridges (for spans up to 45m) are available. These are similar in appearance to a beam bridge, but structurally more substantive. They can be pre-assembled as separate units, transported and assembled at the crossing location. The nature of the bridging to be used will be agreed with the ECoW on-site prior to installation. IFI will be consulted if required with respect to any crossing.
1069. The access road to the WTP site would cross tributaries of the Kilmastulla River (WBX004, WCX002, WBP221), north of the junction of the access road with the R445 Regional Road. The permanent bridges required for these crossings would be constructed as single span structures using precast concrete or steel sections such that there would not be any in-stream works required. The bridge abutments would be constructed at least 5m back from each bank of the stream.
1070. No vehicles will enter watercourses during the Construction or Operational Phases of the Proposed Project. Bridging will incorporate silt control fencing to prevent loose material spilling from construction vehicles into watercourses. The Contractor will check each crossing to ensure that the bank is suitably stable for the type of temporary bridge to be deployed (e.g. ensure the span of the bridge is long enough for it to rest fully on the ground and not impact on the banks). Where larger beam bridges are required, bridge abutments will be constructed at least 5m back from each bank of the watercourse in order to maintain the bank habitat and maximise the riparian corridor.

8.8.3.2 Mitigation Measures to Control and Prevent the Spread of Invasive Non-Native Aquatic Species

1071. As previously noted in Section 8.8.2.1.3, a Non-Native Invasive Species Management Plan has been prepared and included in the CEMP (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 Zol of the Proposed Project, having regard to the specific timing/seasonal constraints that apply in relation to each individual species. The mitigation measures to control and prevent the spread of terrestrial INNS, as outlined in Section 8.8.2.1.3, will be implemented for INNS aquatic species, where relevant.
1072. Considering the Proposed Project spans four counties, maintaining site hygiene at all times will be essential to prevent the spread of INNS. All plant and equipment employed on the construction site (e.g. excavator, footwear) 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 such as Japanese knotweed and crayfish plague in accordance with the OPW Environmental Standard Operating Procedures (OPW 2011), IFI Biosecurity Protocol (IFI 2010) and Uisce Éireann guidelines (Uisce Éireann 2018; 2024a; 2024b). 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). 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 document Management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII

2020a) which details the treatment necessary for the aforementioned species, together with the required reporting procedure if encountered.

1073. 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. Internal coating of the pipes will be undertaken to discourage attachment of zebra mussel to the pipe wall.
1074. As mentioned in Section 8.7.1.1.5, 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.
1075. 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.
1076. 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 2,000m³/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.

8.8.4 Ornithology – Breeding and Wintering Birds

1077. Vegetation clearance (e.g. hedgerows, trees, scrub and grassland) will generally be avoided between 1 March and 31 August, to avoid impacts on nesting birds.

1078. 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.

1079. Areas where regular breeding or wintering concentrations of KERs have been recorded over the survey periods (as detailed in Sections 8.3.4 and Section 8.3.5) have been identified as 'important bird areas'. To protect these species at these locations, seasonal restrictions will be implemented, during which no vegetation clearance or construction activity will take place. The relevant restriction periods for each location and species are detailed in. Where it is not possible to fully avoid works during these periods due to programme constraints, conflicting mitigation or safety considerations, an ECoW will be present to undertake pre-works inspections and oversee activities in accordance with the measures outlined in the paragraph above.

1080. To mitigate against the degradation of breeding and winter bird habitat (aquatic pollution via suspended solid, hydrocarbon, chemicals, etc.), mitigation outlined within Aquatic Ecology (Section 8.8.3), will be applicable to these KERs.

Table 8.94: Proposed Periods of Seasonal Restrictions for Important Bird Areas Within the Zone of Influence of the Proposed Project

Location and Description	Chainage	Distance from Proposed Project	Activity/ Nearby Activity	Species	Breeding/ Wintering	Period of Seasonal Restrictions*
Drumminascart and Lough Oura County Tipperary	TW – 24000	600m	Pipeline construction, vegetation clearance	- Black-headed gull - Great crested grebe	Breeding	March to July
Gorteenkeel, Island and Clanarrow County Offaly	TWC – 12800 to TWC – 14800	0m	Pipeline construction, vegetation clearance	- Lapwing - Ringed plover - Sand martin - Snipe - Black-headed gull	Breeding	March to July
Ballyhugh or Springfield County Offaly	TWC – 19400 to TWC – 20000	0m	Pipeline construction, vegetation clearance	Barn Owl	Breeding	April to September
Rathlumber, County Offaly	TWC – 22800 to TWC – 24800	0m	Pipeline construction, vegetation clearance, directional drilling	- Lapwing - Ringed plover - Snipe - Black-headed-gull	Breeding	March to July
Ticknevin Bog, County Kildare	TWD – 9900 to TWD – 13900	0m	Pipeline construction, vegetation clearance	- Lapwing - Snipe	Breeding	March to July

Location and Description	Chainage	Distance from Proposed Project	Activity/ Nearby Activity	Species	Breeding/ Wintering	Period of Seasonal Restrictions*
Drehid/ Loughnacush and Cloona, County Kildare	TWD – 17900 to TWD – 24900	0m	Pipeline construction, vegetation clearance, directional drilling	- Lapwing - Snipe - Woodcock	Breeding	March to July
Derrycreeb, County Offaly	TWD – 26900 to TWD – 27900	0m	Pipeline construction, vegetation clearance	Woodcock	Breeding	March to July
Parteen Basin at the RWI, County Tipperary	RW – 0	0m	RWI Construction	- Tufted duck - Mute swan	Wintering	October to March

Note: *Seasonal restrictions have been determined using the breeding and wintering periods of KER species, as outlined in Gilbert *et al.* (1998) and Hardey *et al.* (2013).

8.8.5 Summary of Mitigation and Monitoring During the Construction Phase of the Proposed Project

1081. Table 8.95 summarises the mitigation and monitoring during construction.

Table 8.95: Summary of Mitigation and Monitoring During the Construction Phase of the Proposed Project

Key Ecological Receptor	Potential Impact	Mitigation
General mitigation measures that apply to all KERs	- Habitat loss and fragmentation - Habitat degradation - Disturbance and displacement - Risk of mortality or injury - Barrier effect - Introduction of INNS and pathogens and - Loss of prey (bats)	- A suitably qualified ECoW will be appointed to oversee and implement all mitigation measures - Multidisciplinary pre-construction surveys will be conducted by an ECoW to identify existing and new constraints - Vegetation removal will be seasonal - Mature trees, treelines, and hedgerows will be retained, where feasible - Fencing and signage will be erected to demarcate prohibited working areas/buffer zones - Main pipeline construction works will be carried out outside of winter period to reduce impacts towards surface and groundwater caused by sediment loading - Landscaping will use native species on a like-for-like basis
Designated conservation areas: - Lower River Shannon SAC - Lough Derg (Shannon) SPA - 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 SPA - Slieve Aughty Mountains SPA - River Boyne and River Blackwater SPA - Poulaphouca Reservoir SPA - Middle Shannon Callows SPA) - Screggan Bog NHA - Annaghmore Lough Fen (Offaly) pNHA - Willsborough Esker pNHA - Clonad Wood pNHA - Mount St. Joseph Woods pNHA - Grand Canal pNHA	- Habitat loss and fragmentation - Habitat degradation as a result of excavation and 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 INNS and pathogens - Disturbance/displacement - Mortality risk from construction work and traffic - Barrier effect	- All construction works will be in accordance with IFI guidelines (IFI 2016) or as otherwise agreed with IFI during the Construction Phase - Secant piles will be used as a barrier between water and construction at Parteen Basin - Concrete revetment mats will prevent erosion at Parteen Basin - A double row of heavy-duty Type 3 silt curtains will be used during the installation and removal of the temporary piling platform at Parteen Basin - Main construction works will be carried out outside of winter period – water. - Guidelines set out by the NRA (2010) and Invasive Species Ireland (n.d.) will be implemented and followed accordingly - All plant and equipment will be cleaned down before leaving site - Staff will be briefed on the presence of INNS and pathogens in the area and the guidelines associated with their management - Abstraction velocities for hydrostatic testing will be kept below 0.15m/s and through a fine mesh not greater than 3mm aperture. The abstraction pipe will not touch the riverbed. 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. Performance targets for abstraction will be adhered to - Solid screens or barriers will be erected around dust activities or the site boundary that are, at least, as high as any stockpiles on site. During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate so that moisture content is high enough to increase the stability of the soil and thus suppress dust

Key Ecological Receptor	Potential Impact	Mitigation
Terrestrial habitats	- Habitat loss - Habitat fragmentation - Habitat degradation - Introduction of INNS and pathogens	- Perimeter planting and species rich semi-natural grassland (referred to in the Landscape Plans as wildflower mix)/woodland planting will be carried out around the RWI&PS, WTP, BPT, BPS, FCV and TPR as well as screen planting - Watercourses with drainage ditches will be planted with wetland herbs and grasses - Severed linear habitats will be replanted as soon as construction is complete - All replanted vegetation will be locally sourced native species - Hazardous materials and stockpiles will not be stored within 10m of trees or hedgerows - All trees that are intended to be retained will be fenced off using the RPA as a guideline - Extensive tree cutting and vegetation removal will be minimised - Pre-construction monitoring surveys to confirm the presence of INNS and pathogens - All trees noted as having ash dieback will be flagged and demarcated - Guidelines set out by the NRA (2010) and Invasive Species Ireland (n.d.) will be implemented and followed accordingly - Invasive non-native plant material and dead leaf litter associated with ash dieback on-site will be removed to a licensed facility - All plant and equipment will be cleaned down before leaving site - Staff will be briefed on the presence of INNS and pathogens in the area and the guidelines associated with their management - Microfilters will be fitted to the rising main - Solid screens or barriers will be erected around dust activities or the site boundary that are, at least, as high as any stockpiles on site. During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate so that moisture content is high enough to increase the stability of the soil and thus suppress dust
Rare/protected flora	- Habitat loss - Habitat fragmentation - Habitat degradation - Introduction of INNS and pathogens	- Assign designated areas for stockpiling of excavated material during construction in consultation with an ECoW to avoid disturbance and loss of any rare/protected flora - Robust measures will be taken to protect plants in the surroundings, including establishing exclusion zones by installing temporary fences or other similar measures around the plants - Where practicable, plants will be left <i>in situ</i> and protected during construction - Where such impacts are unavoidable, plants will be translocated in autumn when soils are warm and moist and new root growth is possible before the onset of winter - The vegetated topsoil (known as turves) will be dug to a depth of 300mm in discrete block sections (to minimise the soil particles breaking up) using an excavator bucket and side-cast for translocation. Careful attention will be made not to side-cast the vegetated topsoil/turves where existing records of basil thyme and yellow archangel occur in the immediate surroundings to avoid smothering of vegetation - Shallow excavations (300mm depth) with an excavator bucket will be carried out at the receptor area to facilitate translocation of the specimens - The vegetated turves containing the specimens will be carefully translocated in blocks (vegetation side up) and placed within the recently dug out receptor area and reinstated with excavated material to ensure that the translocated turves are firmly in place and that the plant specimens are facing vegetation side up - Subsequent watering of the translocated turves will be carried out during periods of dry weather in autumn - Ensure that the works are carried out during periods of dry weather - Guidelines set out by the NRA (2010) and Invasive Species Ireland (n.d.) will be implemented and followed accordingly - All plant and equipment will be cleaned down before leaving site - Staff will be briefed on the presence of INNS and pathogens in the area and the guidelines associated with their management

Key Ecological Receptor	Potential Impact	Mitigation
Bats	- Habitat loss and fragmentation - Loss of bat roost habitat - Loss of roost - Mortality or injury to bats - Disturbance/displacement	- Mitigation measures will be carried out in accordance with Bat mitigation Guidelines for Ireland (Marnell <i>et al.</i> 2022) - Bat relocation will be done by a licensed specialist and in consultation with the NPWS - Mature trees noted as moderate to high PBR will be felled between late August to mid-November - Phase two PBR survey will be carried out on all trees already flagged as PBR at least one month before they are due to be felled - Tree felling will be done on mild days - Replanting will aim to increase species diversity - One alternative bat roost will be built near Parteen Wood, one year prior to the original roost's removal - Bat house building will follow specifications outlined in Section 8.8.2.2 - Bat boxes will be erected, and seasonal inspections will take place for up to two years - Lighting will be restricted for working hours and further in areas of high bat activity. - Construction at watercourse crossings will cease at sunset and replanting in these areas will commence once works have been completed - Construction works within close proximity to roosts and important commuting/foraging areas will cease at sunset - Given the need to remove five roosts and the impacts on bats that are predicted for the Proposed Project, a derogation licence under Section 54 of S.I. 477 of 2011 will be required. The Bat Derogation Licence application is included in Appendix A8.24 - During pre-construction surveys, in the event that new bat roosts are identified within the Zol of the Proposed Project that would need to be removed or disturbed and cannot be mitigated for, a new derogation licence under Section 54 of S.I. 477 of 2011 will be required
Badger	- Loss of breeding/resting sites - Habitat loss and fragmentation - Disturbance/displacement - Mortality risk	- No machinery will be used within 30m of a sett or within 50m during the breeding season - Pile driving will not take place within 150m of active setts - Night-time working will be restricted - Where the destruction of active badger setts cannot be avoided, exclusion and destruction will be carried out under the supervision of an appropriately qualified ECoW - Spoil heaps will be stored at least 30m away from a sett - Guidelines set out by the NRA (NRA 2006d) will be implemented and followed accordingly - The construction of artificial sett(s) within the Proposed Project may be proposed – this is dependent on the pre-construction surveys. Artificial sett(s) will be established in close proximity to existing setts
Otter	- Habitat loss/ habitat fragmentation - Disturbance/displacement - Risk of mortality	- No construction machinery will be used near active holts (150m of a breeding holt), light work may be done under licence from the NPWS - All watercourse crossings will be carried out in consultation and accordance with IFI - Given the need to disturb three holts and the impacts on otter that are predicted for the Proposed Project, a derogation licence under Section 54 of S.I. 477 of 2011 will be required. The Otter Derogation Licence application is included in Appendix A8.25 - During pre-construction surveys, in the event that new otter holts are identified within the Zol of the Proposed Project that would need to be removed or disturbed and cannot be mitigated for, a new derogation licence under Section 54 of S.I. 477 of 2011 will be required - Guidelines set out by the NRA (NRA 2008a) will be implemented and followed accordingly - A 1m-wide otter run/ledge will be provided between the site security fence and the edge of the intake structure - The construction of an artificial holt(s) within the Proposed Project may be proposed – this is dependent on the pre-construction surveys. Artificial holt(s) will be established in close proximity to existing holts

Key Ecological Receptor	Potential Impact	Mitigation
Other faunal species protected under the Wildlife Acts	- Habitat loss/ habitat fragmentation - Disturbance/ displacement - Risk of mortality	There is no known method for excluding these species. Vegetation clearing works will take place between September and February inclusive as far as practicable. This will avoid the majority of the main breeding season for most small mammal species (Hayden & Harrington 2001)
Invertebrates: - Marsh fritillary - Mollusc species (Lilljeborg's whorl snail and brown snail)	- Habitat loss - Mortality associated with vegetation removal and construction activities	- Areas with suitable habitat for marsh fritillary species have largely been avoided through route selection. Areas within the Proposed Project where devil's-bit scabious was recorded will be retained and fencing will be used to protect them from construction activities - Pre-construction marsh fritillary larval web surveys will be undertaken. If larval webs are present within the Proposed Project, they will be translocated to suitable habitat outside of the working area that will remain unaffected by construction works - Lilljeborg's whorl snail and brown snail will be collected from within the RWI&PS site and transferred to alternative suitable habitat outside of the working area in advance of construction. For brown snail, monitoring will be carried out to check for the presence of this snail prior to releasing collected specimens, and then sampling of the recipient site after three and six years to gather information on the success of the introduction
Reptiles and amphibians: - Common frog - Smooth newt	- Habitat loss - Mortality associated with vegetation removal and construction activities	Pre-construction surveys will be carried out prior to any in-stream works during the season where frogspawn/tadpoles and newts are known to be present. Removal of this species under licence from the NPWS can be carried out if necessary
Aquatic ecology: - Watercourses - White-clawed crayfish - Lamprey species - Atlantic salmon - European eel - Other fish species	- Habitat loss - Habitat degradation as a result of suspended solids pollution - Habitat degradation as a result of pollution from other substances - Habitat degradation as a result of hydrological impacts of discharges from Washout Valves - Disturbance/ displacement - Invasive non-native aquatic species	- Construction works within/adjacent to watercourses will be in accordance with IFI guidelines (IFI 2016) or as otherwise agreed with IFI during the Construction Phase - Watercourse crossing method statements will be agreed with IFI - Direct discharges will not be allowed - Sediment loading will be controlled by the use of silt socks, silt fences, silt curtains, bunds and silt ponds - Refuelling 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 - Stockpiling will be done at least 10m back from all watercourses (and up to 50m from sensitive watercourses, depending on land topography, soil type, channel width/gradient and critical habitats/species, as determined by an ECoW in consultation with IFI) - At Washout Valve locations, there will be a settlement of water allowed to remove suspended solids and a discharge standard of no greater than 25mg/L suspended solids. No discharges will occur in flood conditions - During commissioning, the source of water that will be used for hydrostatic pressure testing will be sampled prior to testing and the required water treatment determined to remove contaminants and/or INNS - Electrofishing (under licence) will be carried out at open-cut crossings - Pre-commencement white-clawed crayfish survey will be undertaken at open-cut crossings, and if present, individuals will be trapped and translocated (under licence) to upstream of the works - In-stream works will not be carried out in watercourses frequented by salmon or trout during the annual close season and will be undertaken outside of the lamprey spawning season. The timing of works will always be considered on a site-specific basis and in agreement with the IFI - Salmonid spawning gravels and juvenile lamprey habitat will be removed where encountered and reinstated after construction works are completed - Reinstatement works will be monitored/supervised by an ECoW - Abstraction velocities for hydrostatic testing will be kept below 0.15m/s and through a fine mesh not greater than 3mm aperture. The abstraction pipe will not touch the riverbed. The 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. Performance targets for abstraction will be adhered to

Key Ecological Receptor	Potential Impact	Mitigation
Breeding birds of conservation concern Wintering/ migratory birds of conservation concern	- Habitat loss and fragmentation - Habitat degradation - Disturbance/ displacement	- Where practicable, vegetation clearance will be seasonal (outside of 1 March to 31 August) - An ECoW will inspect all areas prior to construction for breeding birds - Buffer zones will be used around occupied nests. Distances will depend on the species present - Areas with no nests will be cleared within three days of being checked - Seasonal restrictions will be implemented for important bird areas where concentrations of breeding or wintering birds congregate. Where it is not possible to avoid works, pre-works inspections will be undertaken by an ECoW and buffer zones will be established - To mitigate against the degradation of habitat, mitigation outlined in Aquatic Ecology (Section 8.8.3), will be applicable to this KER

8.9 Mitigation and Monitoring Measures During the Testing and Commissioning Phase of the Proposed Project

1082. Mitigation measures proposed to avoid and/or reduce the potential impacts of the Proposed Project on biodiversity during the Testing and Commissioning Phase are as outlined in Section 8.8, and therefore are not repeated here.

8.10 Mitigation and Monitoring Measures During the Operational Phase of the Proposed Project

1083. Mitigation measures are proposed herein, with reference to guidance documents that are considered best practice, to avoid and/or reduce the potential impacts of the Proposed Project on biodiversity during the Operational Phase.

8.10.1 Designated Areas of Nature Conservation

1084. Mitigation measures for designated areas of nature conservation are the same as the measures outlined in Section 8.10.2 to Section 8.10.3 for each of the KERs, and therefore are not repeated here.

8.10.2 Terrestrial Ecology

8.10.2.1 Terrestrial Habitats

1085. There are limited opportunities for the Treated Water Pipeline to result in impacts on terrestrial habitats and flora during operation. The activity most likely to result in an impact is the operation of the Washout Valves, either as part of planned maintenance or in an emergency situation. In the rare instance of local discharges from Washouts Valves to adjacent land during drain-down events, a local temporary soakaway will be formed using sandbags or equivalent. The water in the Treated Water Pipeline is treated drinking water and as such is required to contain a certain amount of chlorine to maintain quality along its length. To avoid potential impacts associated with local discharge of chlorinated water from Washout Valves, controls and features include the use of dechlorination tablets placed within a perforated basket allowing water to pass through. 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 operation of discharging from Washout Valves.

1086. Along sections of the Treated Water Pipeline from the WTP to the BPT, at species-rich grasslands/wetlands, sensitive wetlands, or on steep gradients, puddle clay stanks will be used as an impermeable barrier to the free movement of water to avoid impacts associated with preferential flow. These areas are shown in the Environmental Masterplan (Figure 4.106 to Figure 4.184). This will be undertaken to prevent the bedding material being used as a conduit for the transference of groundwater. The stanks will be placed perpendicular to the pipe to a height of at least the depth of the granular

material and to the full width of the trench excavated, in the order of 200mm thickness, and keyed into the sides of the trench. At a localised level, stanks are constructed at field boundaries or every 50m to contain the groundwater within the holding of the landowner.

1087. In relation to habitat reinstatement, all KER habitats reinstated post the Construction Phase will be monitored to determine the overall success of the reinstatement process. The post-construction monitoring programme will require annual monitoring, commencing on the year of habitat reinstatement, for a minimum period of five years to confirm viable growth is occurring, and undertake remediation works if deemed necessary. The success of habitat reinstatement will be reviewed by a suitably qualified and experienced ECoW at the end of that period to determine whether the monitoring period needs to be extended further, if for example it is viewed that the habitat has not stabilised or become fully established by that time. Any extension to the monitoring period will need to consider whether on-going monitoring should be at annual or longer intervals, for example, at +3 years post-creation or +6 years post-creation.
1088. In relation to the translocation of rare/protected flora, monitoring will be carried out in the subsequent weeks following reinstatement and the onset of the growing season in the following spring, and again during the flowering period in June/July. The total number of individual plants will be recorded to monitor plant recovery over time to inform if translocation was successful.

8.10.2.2 Mammals – Bats

1089. All hedgerows and treelines removed during construction will be replanted with native whips and advanced nursery stock. Restrictions on the type of planting that can be put over the top of the pipeline include specifically not planting trees that would grow to more than 4m in height. A mosaic habitat would be reinstated in place. Monitoring of newly planted hedgerows and treelines will be undertaken annually, commencing on the year of habitat reinstatement, for a minimum period of five years to confirm viable growth is occurring, and undertake remediation works if deemed necessary. Similarly, surveying of important commuting routes and feeding areas over one full summer will be undertaken annually over a period of five years by an experienced bat ecologist, which will provide information on whether or not the bats are still using the areas and if replanted corridors are successful. The success of replanted corridors will be reviewed by a suitably qualified and experienced bat ecologist at the end of that period to determine whether the monitoring period needs to be extended further, if for example it is viewed that the corridors have not stabilised or become fully established by that time. Any extension to the monitoring period will need to consider whether on-going monitoring should be at annual or longer intervals, for example, at +3 years post-creation or +6 years post-creation.
1090. During this period, monitoring of erected bat boxes will also take place. Bat boxes will be examined by an experienced, licensed bat specialist. Annual cleaning of these boxes will be required by the bat specialist, as well as replacement if they become damaged or lost. Bat boxes will be checked seasonally for a period of two years after construction.
1091. Monitoring will take place post-construction works by a qualified bat specialist. This monitoring will involve the following aspects:
- Monitoring of the bat house within one year of construction and for a minimum of three years post construction. Register bat house with BCIreland
 - Inspection of bat boxes within one year of erection of bat box/rocket box. Register bat box scheme with BCIreland. This will be undertaken for a minimum of two years
 - A full summer bat survey will be undertaken post-works, over a period of five years to monitor any other bat mitigation measures.

1092. In general, artificial light creates a barrier to commuting bats so lighting will be minimised at the RWI&PS, WTP, BPT, BPS, FCV and TPR especially at areas of interest for bat species. 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 specification will meet the lighting guidelines (BCT 2023) and will be automatically controlled and turned off unless operational staff are present on-site. These lighting specifications are as follows:

- All luminaires used will lack UV/IR elements to reduce impact
- 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). This Kelvin level is required to be reduced to 2,200 in lesser horseshoe bat zones (i.e. the 2km CSZ around Building 1)
- Luminaires will feature peak wavelengths higher than 550 nanometer (nm) to avoid the component of light most disturbing to bats
- 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
- As a last resort, accessories such as baffles, hoods or louvres will be used to reduce light spill and direct it only to where it is needed
- 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.

8.10.2.3 Mammals – Eurasian Badger

1093. As noted in Section 8.8.2.3, in order to mitigate for the direct loss and disturbance of badger setts within the Proposed Project, artificial setts will be established in suitable locations within undisturbed areas along the Proposed Project, that will not interfere with the integrity of the proposed pipeline. The locations of the artificial setts will be established following the pre-construction badger surveys to identify any changes to badger activity. The artificial setts however, will be established in close proximity to existing setts currently within the Proposed Project to provide a suitable alternative, and within the badger groups territory. The artificial setts will be located in well-drained soils and will be landscaped to ensure cover. The artificial setts will be monitored quarterly for a period of at least one year following the completion of construction works. These proposed mitigation measures have regard to NRA (2006d) guidance, which is considered best practice. Impacts on badger foraging resources during the Operational Phase are considered non-significant, therefore no specific mitigation measures are proposed.

1094. Mammal-resistant or mammal-proof fencing will be required to guide badgers to passage facilities and to prevent animals entering the RWI&PS, WTP, BPT, BPS, FCV and TPR. The specification for mammal-resistant fencing is given in the NRA Guidelines (NRA 2008a; 2006d). Fencing will be recessed and will guide badgers safely around the infrastructure sites. Dedicated mammal crossings will be more readily used if the approach is softened through the use of appropriate planting. Mammal-resistant fencing will be incorporated at the earliest possible stage during construction, preferably during erection of the permanent fence line. Periodic monitoring and maintenance will be completed to ensure the long-term effectiveness of mammal-resistant fencing. Monitoring and maintenance activities will be completed in accordance with the NRA Guidelines, i.e. upon completion of works, quarterly monitoring will be carried

out over a period of at least one year to ensure the success of the measures employed (NRA 2008a; 2006d).

8.10.2.4 Mammals – Otter

1095. As per the measures to protect badger during the Operational Phase, mammal-resistant or mammal-proof fencing will also be required to guide otters to passage facilities and to prevent animals entering the RWI&PS, WTP, BPT, BPS, FCV and TPR. The specification details are as discussed in Section 8.10.2.3.

8.10.2.5 Mammals – Other Mammal Species

1096. As per the measures to protect badger during the Operational Phase, mammal-resistant or mammal-proof fencing will also be required to guide other mammal species to passage facilities and to prevent animals entering the RWI&PS, WTP, BPT, BPS, FCV and TPR. The specification details are as discussed in Section 8.10.2.3.

8.10.2.6 Invertebrates

1097. No likely significant negative effects on invertebrate KERs are predicted during the Operational Phase of the Proposed Project; therefore, no specific Operational Phase mitigation measures are required.

8.10.2.7 Other Species Groups – Reptiles and Amphibians

1098. Whilst frogs and smooth newt may be present within the study area environs, the Proposed Project would not affect any identified specific breeding pools or wetland habitats for amphibians during the Operational Phase. Therefore, mitigation is not considered necessary for amphibians.

8.10.3 Aquatic Ecology

1099. The Proposed Project would result in an increase of impermeable surfaces related to the RWI&PS, WTP, BPT, BPS, FCV and TPR which could give rise to an increase in surface water runoff to downstream water bodies. To ensure the Proposed Project does not result in an increase in runoff, the design of the main infrastructure sites includes provisions for SuDS to store, harvest, and/or attenuate any additional runoff generated. Techniques such as permeable surfaces and a Stormwater Attenuation Tank will be used to manage surface water runoff at the sites. Further details of this are provided in Chapter 4 (Proposed Project Description). There will be no wastewater discharge from welfare facilities; it will be contained and removed by tanker at appropriate intervals for disposal in a licensed manner via a licensed facility. SuDS will be further developed during detailed design and will reference recognised industry standards such as the CIRIA SuDS Manual C753 (CIRIA 2015).

1100. It is proposed to abstract up to a maximum of 3.47m³/s from the water in Parteen Basin. The average flow at Parteen Basin is approximately 180m³/s and the current statutory requirement for compensation water into the Lower River Shannon (also known as the 'Old River Shannon') is 10m³/s. From 1990 to 2015, ESB typically directed 90-95% of the flow through the basin to Ardnacrusha Generating Station for hydropower supply. Water levels will be managed within the same water level Normal Operating Band on Lough Derg and within the upper and lower water levels that ESB apply to Parteen Basin, as currently applies. 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.

1101. In relation to discharges during the Operational Phase from the Washout Valves to Temporary and Permanent Discharge Locations, the following measures will be employed to avoid or reduce aquatic habitat degradation associated with hydrological impacts:

- Discharges proposed to water bodies will be agreed with the relevant regulatory authorities (EPA, IFI and OPW) and carried out in accordance with any conditions imposed in regulatory authorisations
- Washout Valves with a permanent outfall have been designed to minimise the impact of the discharge (should it be required) through the suitable orientation and appropriate engineering design of the outfall structure to dissipate the energy from the discharge. They will also include the construction of a chamber to facilitate the use of dechlorination media (dechlorination tablets). Discharging from Washout Valves where there is no permanent outfall will require dechlorination equipment to be brought to site as part of the operational procedure
- Levels of residual chlorine would be reduced to below <0.005mg/L, as required by the Quality of Salmonid Waters Regulations (1988).

8.10.3.1 Invasive Non-Native Aquatic Species

1102. Mitigation measures to control the transfer or spread of INNS beyond Parteen Basin during the Construction Phase will continue to be employed throughout the Operational Phase (Section 8.8.3.2). Provision has been made to allow each of the twin rising mains to be emptied to a 2,600m³ capacity RWRM Scour Tank at the RWI&PS. The RWRM Scour Tank will be located to the side of the pumping station and drain back to the Inlet Chambers for re-pumping to the WTP. 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. This ability to effectively 'switch off' one of the two rising mains will 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 the mussels can survive for two weeks by closing down filtration in a hostile environment. The closed rising main can be isolated for longer than two weeks, thus enabling the chemical treatment of any remaining mussels and their veligers in the system prior to the water entering the WTP.

8.10.4 Ornithology – Breeding Birds

1103. Barn owl was the only species identified as subject to a significant effect during the Operational Phase, due to the permanent loss of a breeding nest site contained within the boundary of the Proposed Project. To mitigate this, a targeted compensation measure will be implemented through the provision of an artificial nest box designed specifically for barn owls.

1104. One nest box will be installed at an appropriate location within the territory of the breeding site that will be lost, at a location in the townland of Ballyhugh or Springfield County Offaly, between Chainage TWC – 19400 to TWC – 20000. The new site within the Proposed Project will be selected by the judgement of suitably qualified ECoW/ornithologist and be based on habitat suitability, availability of foraging areas (such as rough grassland, field margins, and hedgerow networks), and low risk of predation or human interference. The box will be installed in a secure, elevated position, either on a suitable mature tall tree along an existing treeline or woodland edge or if no suitable location exists, on a custom-built pole and will be designed following the guidance outlined by Lusby and McCarthy (2022).

1105. The effectiveness of this mitigation will be monitored annually for a period of five years following installation. Monitoring will assess occupancy, breeding activity, and any signs of disturbance, with findings used to inform any adaptive management measures, if required. This approach ensures that the functional loss of the nest site is appropriately offset and that potential long-term impacts on the local barn owl population are minimised.
1106. Based on the level of flight activity identified during surveys, it is recognised that there is potential for a collision risk associated with the 38 kV OHL. Therefore, flight diverters/markers will be installed at the following locations over the Lower River Shannon (between Polesets 65B to 69B) and the Headrace (between 64B to 65B).
1107. Diverters will consist of either spiral devices which wrap around the wire or hanging devices which are suspended from the wire with fixed or swinging plates or flappers (Image 8.3). They will be placed at regular intervals of at least 5m apart and will be concentrated towards the centre of the span between the polesets. Such devices have been shown to reduce collision rates by 50% or more based on a literature review conducted by EirGrid (2020).

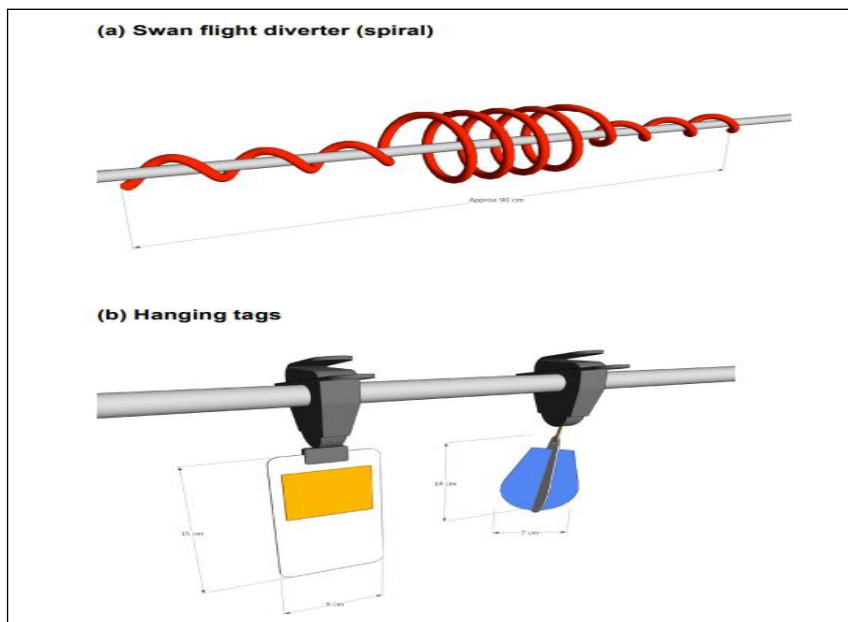


Image 8.3: Example of Bird Flight Diverters

8.10.5 Ornithology – Wintering Birds

1108. Despite the assessment conclusion that disturbance during operation of the Proposed Project is not likely to result in any population-level significant effects on wintering birds, landscape reinstatement around the proposed infrastructure sites will further minimise the potential disturbance to wintering birds from human activity.
1109. Similarly to what has been discussed in Section 8.10.4, flight diverters/markers will be installed over the Lower River Shannon (between Polesets 65B to 69B) and the Headrace (between 64B to 65B).

8.10.6 Summary of Mitigation and Monitoring During the Operational Phase of the Proposed Project

1110. Table 8.96 summarises the mitigation and monitoring during operation.

Table 8.96: Summary of Mitigation and Monitoring During the Operational Phase of the Proposed Project

Key Ecological Receptor	Potential Impact	Mitigation
Designated conservation areas: - Lower River Shannon SAC - Charleville Wood SAC - Dovegrove Callows SPA - Lisduff Fen SAC - Lough Derg (Shannon) SPA - Lough Derg, North-East Shore SAC - Lower River Shannon SAC - Middle Shannon Callows SPA - River Barrow and River Nore SAC - River Boyne and River Blackwater SAC - River Boyne and River Blackwater SPA - River Shannon Callows SAC - Rye Water Valley/Carton SAC - Sharavogue Bog SAC - Screggan Bog NHA - Annaghmore Lough Fen (Offaly) pNHA - Willsborough Esker pNHA - Clonad Wood pNHA - Mount St. Joseph Woods pNHA	- Habitat degradation as a result of hydrological impacts (water abstraction) - Habitat degradation as a result of hydrological impacts (repair and maintenance) - Habitat degradation as a result of introducing or spreading INNS - Habitat degradation as a result of pollution risk - Disturbance/displacement - Mortality risk	- Releases from Washout Valves will be controlled in accordance with EPA and OPW and will be subject to the applicable permitting regime - Alarms will be used to alert operators of possible leaks - Main infrastructure will include SuDS and oil interceptors, or rain water harvesting - Replanted vegetation will be monitored for five years following completion, and remediation works undertaken if deemed necessary. Dead vegetation will be removed and replanted - Mammal-resistant fencing will be buried into the ground at the permanent infrastructure sites and will aim to help guide terrestrial mammals safely around the sites - Monitoring and maintenance will be carried out in accordance with NRA guidance (NRA 2008a; 2006d) - Bat mitigation measures will be monitored by an experienced bat ecologist. This may be subject to licence from the NPWS - The RWI&PS will be a 'closed loop system'. No discharge of pipeline repair and maintenance water from the RWI&PS will go back to Parteen Basin. The ability to effectively 'switch off' one of the two rising mains will also be important in the control of zebra mussels, reducing the potential for them to be transferred further. The closed rising main can be isolated for longer than two weeks, which will enable the chemical treatment of any remaining mussels and their veligers in the system prior to the water entering the WTP
Terrestrial habitats	- Loss of terrestrial habitat - Alteration of hydrogeological conditions including potential barrier effects or land drainage - Habitat degradation as a result of local discharge of treated water from Washout Valves to adjacent land	- In the rare instance of local discharge from Washout Valves to adjacent land, a local temporary soakaway will be formed using sandbags or equivalent - Controls and features have been designed into the process of discharging from Washout Valves and include the use of dechlorination tablets. Tablets will be placed within a perforated basket allowing discharged water to pass through. Dechlorination will be achieved almost immediately on contact with the tablets - All KER habitats will be monitored annually, commencing on the year of habitat reinstatement, for a minimum period of five years, to determine whether viable growth is occurring and undertake remediation works if deemed necessary
Rare/protected flora		- Monitoring will be carried out in the subsequent weeks following reinstatement and the onset of the growing season in the following spring and again during the flowering period in June/July - The total number of individual plants will be recorded to monitor plant recovery over time to inform if translocation was successful

Key Ecological Receptor	Potential Impact	Mitigation
Bats	- Vegetation trimming - Human disturbance - Light disturbance	- All removed treelines and hedgerows will be replaced with native saplings. Monitoring of these habitats will take place for five years following completion, and remediation works undertaken if deemed necessary - Lighting will be minimised at the RWI&PS, WTP, BPT, BPS, FCV and TPR especially at areas of interest for bat species - Directional lighting will be used to prevent overspill - Annual cleaning of bat boxes will be required as well as replacement if they become damaged - Monitoring will take place post construction by an experienced, licensed bat specialist and will involve: - Monitoring of the bat house within one year of construction for a minimum of three years post construction. Register bat house with BC Ireland - Inspection of bat boxes within one year of erection. Register bat box scheme with BC Ireland. This will be undertaken for a minimum of two years - A full summer bat survey will be undertaken post works, over a period of five years to monitor any other bat mitigation
Badger	- Disturbance/displacement - Loss of foraging habitat	- Mammal-resistant fencing will be installed by burying it into the ground, which will aim to guide badgers safely around the site. The fencing will be designed as per the NRA guidelines (NRA 2006d). Periodic monitoring and maintenance will be completed to ensure long-term effectiveness of the fencing - Artificial setts, that are established in close proximity to existing setts, will be monitored quarterly for at least one year following the completion of construction works
Otter	- Disturbance/displacement - Loss of foraging habitat - Water quality impacts	Mammal-resistant fencing will be installed by burying it into the ground, which will aim to guide otters safely around the site. The fencing will be designed as per the NRA guidelines (NRA 2006d). Periodic monitoring and maintenance will be completed to ensure long-term effectiveness of the fencing
Other faunal species protected under the Wildlife Acts	- Disturbance/displacement - Loss of foraging habitat	Mammal-resistant fencing will be installed by burying it into the ground, which will aim to guide mammals safely around the site. The fencing will be designed as per the NRA guidelines (NRA 2006d). Periodic monitoring and maintenance will be completed to ensure long-term effectiveness of the fencing
Invertebrates: - Marsh fritillary - Mollusc species (Lilljeborg's whorl snail and brown snail)	Non-applicable	There are no likely significant negative effects on invertebrate KERs predicted during the Operational Phase of the Proposed Project; therefore, no specific Operational Phase mitigation measures are required
Reptiles and amphibians - Common frog - Smooth newt	Non-applicable	The Proposed Project would not affect any identified specific breeding pools or wetland habitats for amphibians during the Operational Phase. Therefore, mitigation is not considered necessary for amphibians
Aquatic ecology - Lower River Shannon SAC - Watercourses - White-clawed crayfish - Lamprey species - Atlantic salmon - European eel - Other fish species	- Habitat loss and fragmentation - Habitat degradation as a result of hydrological impacts - Habitat degradation as a result of discharges from Washout Valves during drain-down events	- Releases and discharges from the Washout Valves will be controlled in accordance with EPA and OPW requirements and will be subject to the applicable permitting regime to ensure watercourses have the capacity to receive discharges - The use of an alarm to alert operators of a possible leakage or burst within the pipeline or associated infrastructure - Main infrastructure design will include SuDS and an oil interceptor to store and attenuate runoff generated from the permanent infrastructure sites, or rain water harvesting - Oil and chemical storage tanks and containers will be bunded - There are no recommended measures to mitigate impacts caused from an increase in noise levels associated with water pumps for the Proposed Project

Key Ecological Receptor	Potential Impact	Mitigation
Breeding birds of conservation concern Wintering/migratory birds of conservation concern	- Habitat loss and fragmentation - Disturbance and displacement - Collision risk	- A replacement barn owl nest box will be installed within the townland Ballyhugh or Springfield, County Offaly, in a suitable and secure location chosen by a qualified ornithologist. The site will be selected for optimal habitat and low disturbance risk, and its effectiveness will be monitored annually for five years to assess occupancy and breeding success - Flight diverters/markers will be installed over the Lower River Shannon (between Polesets 65B to 69B) and the Headrace (between 64B to 65B)

8.11 Residual Effects

1111. Through the implementation of well-established approaches to mitigation, which will be implemented in accordance with best practice guidance, it would be possible to reduce the impacts to not significant for the majority of ecological receptors, as set out below. However, even after the application of mitigation measures, there would be likely significant residual effects on the following KERs:

- Likely significant negative residual effect on terrestrial habitats at the local to international geographic scale during construction due to the permanent loss of habitat from the infrastructure sites, access roads, and other permanent infrastructure (e.g. land-take associated with the Air Valves, Line Valves, Washout Valves and Lay-Bys; Table 8.56)
- Short-term likely significant negative residual effects on bats at a local level during construction due to loss of five roosts and construction activities resulting in loss and fragmentation of habitat
- Short-term likely significant negative residual effects on badger at a local level during construction due to loss of 33 setts.

8.11.1 Designated Areas of Nature Conservation

1112. The assessment presented in the NIS of the potential for the Proposed Project to impact upon European sites within the Zol, concluded that with the implementation of the mitigation measures proposed, the Proposed Project does not pose a risk of adversely affecting the integrity of any European site (directly or indirectly), either alone or in combination with other plans or projects.

8.11.1.1 Residual Effects in Construction Phase

1113. Although the Proposed Project would not adversely affect the integrity of any European site, it would still have an impact on biodiversity within the boundary of the Lower River Shannon SAC after the implementation of mitigation measures. This is not the case for any other European site within the Zol, as all other European sites are remote from the Proposed Project and the potential impact pathways connecting the sites to the Proposed Project are fully mitigated.

1114. The residual effects on non-qualifying interest habitats and species within the Lower River Shannon SAC are as follows:

- At the proposed RWI&PS there would be a permanent loss of approximately 0.55ha of mixed broadleaved/conifer woodland (WD2) and 216.87m of treelines (WL2)
- Impacts on local bat populations.

1115. None of these residual biodiversity effects compromise the overall biodiversity resource of the Lower River Shannon SAC; thus, no likely significant negative effects are predicted, at any geographic scale. Therefore, there are no likely significant negative residual effects on any European site, at any geographic scale.

1116. Mitigation measures will be implemented to ensure the habitats and species supported by the pNHAs and NHAs within the ZOI of the Proposed Project would not be affected during the Construction Phase. Therefore, the Proposed Project would not result in any likely significant negative residual effects on any NHA or pNHA.

8.11.1.2 Residual Effects in Operational Phase

1117. Prior to the implementation of mitigation measures the only impacts with a potentially significant effect on European sites during the Operational Phase are associated with habitat degradation (e.g. discharges from Washout Valves and discharge outfalls, leaks to potable water, changes to morphology of rivers/streams, spread of INNS). However, mitigation measures will be implemented to ensure that the receiving environment is protected, and the integrity of European sites is maintained. Therefore, the Proposed Project would not result in a likely significant negative residual effect on any European site.

8.11.1.3 Summary of Residual Effects Upon Designated Areas of Nature Conservation

Table 8.97: Residual Effects Upon Designated Areas of Nature Conservation

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Construction Phase					
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 Mountains 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.	Habitat loss and fragmentation	- Habitat loss within the Lower River Shannon SAC at the RWI&PS site and at two polesets within the 38 kV Uprate Works - Ground disturbance associated with movement of machinery - Reduction of supporting habitats for special conservation interest species.	Yes	Mitigation measures are detailed in Section 8.8.2 to Section 8.8.5 and include: - Mitigation measures will be monitored by an ECoW - Invasive non-native plant material on-site will be removed and disposed of at a licensed facility - Where disturbance on protected species is expected, all works will be carried out under licence from the NPWS by a suitably qualified professional i.e. otter holt closure - Vegetation clearance will generally be avoided between March 1 and August 31. Where this seasonal restriction cannot be observed, the area will be inspected by an ECoW prior to clearance - Direct discharge of untreated water from on-site dewatering will not be allowed - Method statements for watercourse crossings and in-stream works will be prepared and agreed with IFI - Watercourse buffer zones will be put in place for watercourses or water bodies within or adjacent to construction works - Sediment runoff will be controlled by the use of silt fences or silt traps and sediment ponds - Salmonid spawning gravels and juvenile lamprey habitats will be	The Proposed Project would not adversely affect the integrity of any European site, however, there would be residual effects on the biodiversity within Lower River Shannon SAC boundaries. Mitigation measures will be implemented to avoid or reduce negative impacts during the Construction Phase; however, at the RWI&PS there would be a permanent loss of 0.55ha of mixed broadleaved conifer woodland (WD2) and 216.87m of treelines (WL2). There would also be residual effects on local bat species (Section 8.5.2.2). These effects are associated with non-qualifying interest habitats and species, and do not compromise the overall biodiversity resource of the Lower River Shannon SAC. Therefore, these residual effects on biodiversity would have no likely significant negative residual effects on any European site, at any geographic scale.
	Habitat degradation as a result of excavation and tunnelling	- Negative effects on water quality within Parteen Basin - Risk of structural fracturing or collapse of watercourses - Risk of bentonite breakouts - Increased silt runoff - Accidental spills of oils and/or chemicals - Temporary ground disturbance during excavations.			
	Habitat degradation as a result of hydrological impacts	- Changes to flow regime - Changes to water chemistry from drainage discharges.			
	Habitat degradation as a result of hydrogeological impacts	- Short-term lowering of groundwater levels as a result of dewatering - Risk of groundwater pollution from accidental chemical/oil spillages.			
	Habitat degradation as a result of air quality impacts	Dust deposition could locally affect habitats within Lower River Shannon SAC.			
	Habitat degradation as a result of introducing or spreading INNS and pathogens	Accidental introduction and spread of INNS and pathogens from construction activities to areas within downstream European sites.			

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
	Disturbance/displacement	Increased human presence, noise and vibration associated with construction at the Lower River Shannon SAC, may displace faunal species from breeding/resting places and from foraging habitats.		removed prior to in-stream works and reinstated after construction works have been completed. This will be carried out in agreement with IFI.	
	Mortality risk from construction work and traffic	Risk of construction traffic collisions with terrestrial faunal species or materials accidentally falling into a water body killing/injuring aquatic fauna at the Lower River Shannon SAC.			
	Barrier effect	- Opencut techniques may barrier aquatic species movement within their catchment - Bankside works associated with trenchless techniques may cause temporary severance of habitats used by otter.			
NHAs and pNHAs: - Screggan Bog NHA - Annaghmore Lough Fen (Offaly) pNHA - Willsborough Esker pNHA - Birr (Domestic Dwelling No. 1, Occupied) pNHA - Birr (Domestic Dwelling No. 2, Occupied) pNHA - Kinnitty (Domestic Dwelling, Occupied) pNHA - Bracken's Dwelling, Near Whiteford pNHA - Clonad Wood pNHA - Mount St. Joseph Woods pNHA - Miltown, Shinrone pNHA.	- Habitat loss and fragmentation - Habitat degradation as a result of hydrological impacts.	- A reduction in foraging habitat for Annex IV Habitats Directive bat species - Short-term lowering of groundwater levels as a result of dewatering. Risk of groundwater pollution from accidental chemical/oil spillages - Risk of indirectly affecting water quality through sediment loading and accidental spillages of chemicals and fuels or through faecal contamination from on-site toilets.	Yes		Mitigation measures will be implemented to ensure the habitats and species supported by the pNHAs and NHAs within the Zol of the Proposed Project would not be affected during the Construction Phase or Operational Phase. Therefore, the Proposed Project would not result in any likely significant negative residual effects on any NHA or pNHA.

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Operational Phase					
- European sites: - Lower River Shannon SAC [002165] - Lisduff Fen SAC [002147] - Sharavogue Bog SAC [000585] - River Barrow and River Nore SAC [002162] - Lough Derg, North-East Shore SAC [002241] - Rye Water Valley/Carlton 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 Boyne and River Blackwater SPA [004232] and - Middle Shannon Callows SPA [004096].	Habitat degradation as a result of hydrological impacts (water abstraction)	The hydrological and water quality 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 of the qualifying interest habitats or species of the Lower River Shannon SAC.	No	See Section 8.10.2 to Section 8.10.5 for mitigation measures. Key mitigation measures for these sites include: Releases from Washout Valves will be controlled in accordance with EPA and OPW and will be subject to the applicable permitting regime. Alarms will be used to alert operators of possible leaks	There are no significant effects predicted on European sites as a result of abstraction during the Operational Phase, therefore there are no mitigation measures proposed. Thus, there would be no likely significant negative residual effects arising from water abstraction on any European sites.
	Habitat degradation as a result of hydrological impacts (repair and maintenance)	- Potential impact from Washout Valves and discharge outfalls located along the pipeline used for repair and maintenance (typically every 50 years). None of the permanent outfalls are located within the boundaries of any European site; however all have a hydrological pathway to one or more European sites - Failure of seal resulting in a leak to potable water which contains traces of chlorine and requirement of repair plant and equipment which may have the potential for leakage of fuel/lubricants - For watercourses crossed by the 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. Potential impacts resulting in bank destabilisation and changes to morphology of rivers/streams. As a result, there could be changes in the flow and sediment processes within the channel.	Yes	- Main infrastructure will include SuDS and oil interceptors, or rain water harvesting - Replanted vegetation will be monitored for five years following completion, and remediation works undertaken if deemed necessary. Dead vegetation will be removed and replanted - Mammal-resistant fencing will be buried into the ground at the permanent infrastructure sites and will aim to help guide terrestrial mammals safely around the sites - Monitoring and maintenance will be carried out in accordance with NRA guidance (NRA 2008a; 2006d) - Bat mitigation measures will be monitored by an experienced bat ecologist. This may be subject to licence from the NPWS	Mitigation measures will be implemented to ensure that the receiving environment is protected and that the conservation objectives of each of these European sites are not negatively affected by the Operational Phase of the Proposed Project. Therefore, there are no predicted residual direct or indirect habitat degradation effects associated with the Proposed Project, and thus no likely significant residual effects on these European sites.
	Habitat degradation as a result of introducing or spreading INNS	Potential impact from the attachment of zebra mussels on intake pipes becoming clogged and/or resulting in the transfer of mussels from the Parteen Basin	Yes		

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
		Other non-native species recorded in the study area may potentially spread during routine repair and maintenance works within European sites downstream of the Proposed Project.			
	Habitat degradation as a result of pollution risk	There are potential sources of water quality contamination from the RWI&PS. However, as a result of the design of site oil and chemical storage and drainage systems, there would be no likely significant effects.	No		There are no significant effects predicted on European sites as a result of pollution during the Operational Phase, therefore there are no mitigation measures proposed. Thus, there would be no likely significant negative residual effects arising from pollution on any European sites.
	Disturbance/ displacement	Increased human presence, noise, and lighting associated with the Operational Phase of the Proposed Project (e.g. general repair and maintenance and inspections) has the potential to temporarily disturb, and potentially displace, birds from important habitat areas.	No		When construction is completed and the Proposed Project is operational, works would be limited to routine regular inspections along the 20m wide Permanent Wayleave and valves, and general repair and maintenance. The level of operational activity would be low, and any significant disturbance effects on birds would be avoided. Therefore, it is considered that these effects are temporary and would not result in a likely significant effect. Thus, no significant residual effects on supporting bird habitats are predicted.
	Mortality risk	There is no risk of mortality to aquatic fauna in Parteen Basin during the Operational Phase.	No		There are no significant effects predicted on European sites as a result of mortality during the Operational Phase, therefore there are no mitigation measures proposed. Thus, there would be no likely significant negative residual effects arising from mortality on any European sites.
NHAs and pNHAs: - Screggan Bog NHA, - Annaghmore Lough Fen (Offaly) pNHA	Habitat degradation as a result of hydrological impacts	Potential impact of discharges from Washout Valves during drain-down events, which would be used during commissioning of the pipeline for removing silt and sediment which may	No		Embedded mitigation measures will be implemented to ensure that the receiving environment is protected and that the conservation objectives of each of nationally designated

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
- Willsborough Esker pNHA - Clonad Wood pNHA - Mount St. Joseph Woods pNHA.		have accumulated during the Construction Phase (in addition to infrequent maintenance every 50 years). Discharges from Washout Valves during drain-down events may enter watercourses connected to any of the five sites. However, design measures used to control discharges from Washout Valves would result in no impacts on water quality and therefore, no habitat degradation and would not result in likely significant effects on the features of interest.			sites are not negatively affected by the Operational Phase of the Proposed Project. Therefore, there are no predicted residual direct or indirect habitat degradation effects associated with the Proposed Project, and thus no likely significant residual effects on these designated sites.

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Construction Phase					
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/Carlton 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 SPA - Slieve Aughty Mountains SPA - River Boyne and River Blackwater SPA - Poulaphouca Reservoir SPA - Middle Shannon Callows SPA.	Habitat loss and fragmentation	- Habitat loss within the Lower River Shannon SAC at the RWI&PS site and at two polesets within the 38 kV Uprate Works - Ground disturbance associated with movement of machinery - Reduction of supporting habitats for special conservation interest species.	Yes	Mitigation measures are detailed in Section 8.8.2 to Section 8.8.5 and include: - Mitigation measures will be monitored by an ECoW - Invasive non-native plant material on-site will be removed and disposed of at a licensed facility - Where disturbance on protected species is expected, all works will be carried out under licence from the NPWS by a suitably qualified professional i.e. otter holt closure - Vegetation clearance will generally be avoided between March 1 and August 31. Where this seasonal restriction cannot be observed, the area will be inspected by an ECoW prior to clearance - Direct discharge of untreated water from on-site dewatering will not be allowed - Method statements for watercourse crossings and in-stream works will be prepared and agreed with IFI - Watercourse buffer zones will be put in place for watercourses or water bodies within or adjacent to construction works - Sediment runoff will be controlled by the use of silt fences or silt traps and sediment ponds - Salmonid spawning gravels and juvenile lamprey habitats will be removed prior to in-stream works and reinstated after construction works have been completed. This	The Proposed Project would not adversely affect the integrity of any European site, however, there would be residual effects on the biodiversity within Lower River Shannon SAC boundaries. Mitigation measures will be implemented to avoid or reduce negative impacts during the Construction Phase; however, at the RWI&PS there would be a permanent loss of 0.55ha of mixed broadleaved conifer woodland (WD2) and 216.87m of treelines (WL2). There would also be residual effects on local bat species (Section 8.5.2.2). These effects are associated with non-qualifying interest habitats and species, and do not compromise the overall biodiversity resource of the Lower River Shannon SAC. Therefore, these residual effects on biodiversity would have no likely significant negative residual effects on any European site, at any geographic scale.
	Habitat degradation as a result of excavation and tunnelling	- Negative effects on water quality within Parteen Basin - Risk of structural fracturing or collapse of watercourses - Risk of bentonite breakouts - Increased silt runoff - Accidental spills of oils and/or chemicals - Temporary ground disturbance during excavations.			
	Habitat degradation as a result of hydrological impacts	- Changes to flow regime - Changes to water chemistry from drainage discharges.			
	Habitat degradation as a result of hydrogeological impacts	- Short-term lowering of groundwater levels as a result of dewatering - Risk of groundwater pollution from accidental chemical/oil spillages.			
	Habitat degradation as a result of air quality impacts	Dust deposition could locally affect habitats within Lower River Shannon SAC.			
	Habitat degradation as a result of introducing or spreading INNS and pathogens	Accidental introduction and spread of INNS and pathogens from construction activities to areas within downstream European sites.			
	Disturbance/displacement	Increased human presence, noise and vibration associated with construction at the Lower River Shannon SAC, may displace faunal species from			

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
		breeding/resting places and from foraging habitats.		will be carried out in agreement with IFI.	
	Mortality risk from construction work and traffic	Risk of construction traffic collisions with terrestrial faunal species or materials accidentally falling into a water body killing/injuring aquatic fauna at the Lower River Shannon SAC.			
	Barrier effect	- Opencut techniques may barrier aquatic species movement within their catchment - Bankside works associated with trenchless techniques may cause temporary severance of habitats used by otter.			
NHAs and pNHAs: - Screggan Bog NHA - Annaghmore Lough Fen (Offaly) pNHA - Willsborough Esker pNHA - Birr (Domestic Dwelling No. 1, Occupied) pNHA - Birr (Domestic Dwelling No. 2, Occupied) pNHA - Kinnitty (Domestic Dwelling, Occupied) pNHA - Bracken's Dwelling, Near Whiteford pNHA - Clonad Wood pNHA - Mount St. Joseph Woods pNHA - Miltown, Shinrone pNHA.	- Habitat loss and fragmentation - Habitat degradation as a result of hydrological impacts.	- A reduction in foraging habitat for Annex IV Habitats Directive bat species - Short-term lowering of groundwater levels as a result of dewatering. Risk of groundwater pollution from accidental chemical/oil spillages - Risk of indirectly affecting water quality through sediment loading and accidental spillages of chemicals and fuels or through faecal contamination from on-site toilets.	Yes		Mitigation measures will be implemented to ensure the habitats and species supported by the pNHAs and NHAs within the Zol of the Proposed Project would not be affected during the Construction Phase or Operational Phase. Therefore, the Proposed Project would not result in any likely significant negative residual effects on any NHA or pNHA.

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Operational Phase					
- European sites: - Lower River Shannon SAC [002165] - Lisduff Fen SAC [002147] - Sharavogue Bog SAC [000585] - River Barrow and River Nore SAC [002162] - Lough Derg, North-East Shore SAC [002241] - Rye Water Valley/Carlton 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 Boyne and River Blackwater SPA [004232] and - Middle Shannon Callows SPA [004096].	Habitat degradation as a result of hydrological impacts (water abstraction)	The hydrological and water quality 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 of the qualifying interest habitats or species of the Lower River Shannon SAC.	No	See Section 8.10.2 to Section 8.10.5 for mitigation measures. Key mitigation measures for these sites include: Releases from Washout Valves will be controlled in accordance with EPA and OPW and will be subject to the applicable permitting regime. Alarms will be used to alert operators of possible leaks	There are no significant effects predicted on European sites as a result of abstraction during the Operational Phase, therefore there are no mitigation measures proposed. Thus, there would be no likely significant negative residual effects arising from water abstraction on any European sites.
	Habitat degradation as a result of hydrological impacts (repair and maintenance)	- Potential impact from Washout Valves and discharge outfalls located along the pipeline used for repair and maintenance (typically every 50 years). None of the permanent outfalls are located within the boundaries of any European site; however all have a hydrological pathway to one or more European sites - Failure of seal resulting in a leak to potable water which contains traces of chlorine and requirement of repair plant and equipment which may have the potential for leakage of fuel/lubricants - For watercourses crossed by the 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. Potential impacts resulting in bank destabilisation and changes to morphology of rivers/streams. As a result, there could be changes in the flow and sediment processes within the channel.	Yes	- Main infrastructure will include SuDS and oil interceptors, or rain water harvesting - Replanted vegetation will be monitored for five years following completion, and remediation works undertaken if deemed necessary. Dead vegetation will be removed and replanted - Mammal-resistant fencing will be buried into the ground at the permanent infrastructure sites and will aim to help guide terrestrial mammals safely around the sites - Monitoring and maintenance will be carried out in accordance with NRA guidance (NRA 2008a; 2006d) - Bat mitigation measures will be monitored by an experienced bat ecologist. This may be subject to licence from the NPWS	Mitigation measures will be implemented to ensure that the receiving environment is protected and that the conservation objectives of each of these European sites are not negatively affected by the Operational Phase of the Proposed Project. Therefore, there are no predicted residual direct or indirect habitat degradation effects associated with the Proposed Project, and thus no likely significant residual effects on these European sites.
	Habitat degradation as a result of introducing or spreading INNS	Potential impact from the attachment of zebra mussels on intake pipes becoming clogged and/or resulting in the transfer of mussels from the Parteen Basin	Yes		

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
		Other non-native species recorded in the study area may potentially spread during routine repair and maintenance works within European sites downstream of the Proposed Project.			
	Habitat degradation as a result of pollution risk	There are potential sources of water quality contamination from the RWI&PS. However, as a result of the design of site oil and chemical storage and drainage systems, there would be no likely significant effects.	No		There are no significant effects predicted on European sites as a result of pollution during the Operational Phase, therefore there are no mitigation measures proposed. Thus, there would be no likely significant negative residual effects arising from pollution on any European sites.
	Disturbance/displacement	Increased human presence, noise, and lighting associated with the Operational Phase of the Proposed Project (e.g. general repair and maintenance and inspections) has the potential to temporarily disturb, and potentially displace, birds from important habitat areas.	No		When construction is completed and the Proposed Project is operational, works would be limited to routine regular inspections along the 20m wide Permanent Wayleave and valves, and general repair and maintenance. The level of operational activity would be low, and any significant disturbance effects on birds would be avoided. Therefore, it is considered that these effects are temporary and would not result in a likely significant effect. Thus, no significant residual effects on supporting bird habitats are predicted.
	Mortality risk	There is no risk of mortality to aquatic fauna in Parteen Basin during the Operational Phase.	No		There are no significant effects predicted on European sites as a result of mortality during the Operational Phase, therefore there are no mitigation measures proposed. Thus, there would be no likely significant negative residual effects arising from mortality on any European sites.
NHAs and pNHAs: - Screggan Bog NHA, - Annaghmore Lough Fen (Offaly) pNHA	Habitat degradation as a result of hydrological impacts	Potential impact of discharges from Washout Valves during drain-down events, which would be used during commissioning of the pipeline for removing silt and sediment which may	No		Embedded mitigation measures will be implemented to ensure that the receiving environment is protected and that the conservation objectives of each of nationally designated

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
- Willsborough Esker pNHA - Clonad Wood pNHA - Mount St. Joseph Woods pNHA.		have accumulated during the Construction Phase (in addition to infrequent maintenance every 50 years). Discharges from Washout Valves during drain-down events may enter watercourses connected to any of the five sites. However, design measures used to control discharges from Washout Valves would result in no impacts on water quality and therefore, no habitat degradation and would not result in likely significant effects on the features of interest.			sites are not negatively affected by the Operational Phase of the Proposed Project. Therefore, there are no predicted residual direct or indirect habitat degradation effects associated with the Proposed Project, and thus no likely significant residual effects on these designated sites.

8.11.2 Terrestrial Ecology

8.11.2.1 Terrestrial Habitats

8.11.2.1.1 Residual Effects in Construction Phase

1118. Mitigation measures will be implemented during the Construction Phase and Operational Phase to minimise the effects of habitat loss and habitat degradation on biodiversity (Section 8.8.2). However, the Proposed Project would nevertheless result in a permanent loss of KER habitats which include: mixed broadleaved/conifer woodland (WD2), mixed broadleaved woodland (WD1), scrub (WS1), (mixed) broadleaved woodland and scrub mosaic (WD1/WS1), (mixed) conifer woodland (WD3), oak-ash-hazel woodland (WN2), riparian woodland (WN5), bog woodland (WN7), bog woodland and scrub mosaic (WN7/WS1), cutover bog and bog woodland mosaic (PB4/WN7), dry-humid acid grassland (GS3), wet grassland (GS4), wet heath (HH3), wet heath and raised bog mosaic (HH3/PB1), raised bog (PB1), poor fen and flush (PF2), hedgerows (WL1) and treelines (WL2). The permanent loss of KER habitats, proposed mitigation measures, and the resulting residual effect is outlined in Table 8.98.

1119. None of the habitats that would be lost are Annex I habitats. The habitat loss is considered to constitute a likely significant negative residual effect at the local to international geographic scale.

Table 8.98: Residual Effects During the Construction Phase on Terrestrial KER Habitats

Proposed Project Element	Proposed Mitigation and Replanting	Residual Effect
RWI&PS	Refer to Landscape Plans in Chapter 4 (Project Description) Figure 4.92 and 4.93.	Permanent loss of 0.55ha of mixed broadleaved/conifer woodland (WD2) and 216.87m of treelines (WL2) resulting in a likely, permanent, significant negative residual effect at the international geographic scale.
WTP	Refer to Landscape Plans in Chapter 4 (Project Description) Figure 4.96 and 4.97.	Permanent loss of 24.11ha of wet grassland (GS4), 2,724.86m of hedgerows (WL1) and 1,494.48m of treelines (WL2) resulting in a likely, permanent, significant negative residual effect at the local geographic scale.
BPT	Refer to Landscape Plans in Chapter 4 (Project Description) Figure 4.90 and 4.91.	Permanent loss of 0.11ha of mixed broadleaved woodland (WD1), 0.75ha of scrub (WS1), 6.71m of hedgerows (WL1) and 223.85m of treelines (WL2) resulting in a likely, permanent, significant negative residual effect at the local geographic scale.
BPS	Refer to Landscape Plans in Chapter 4 (Project Description) Figure 4.89.	Permanent loss of 242.03m of hedgerows (WL1) and 319.14m of treelines (WL2) resulting in a likely, permanent, significant negative residual effect at the local geographic scale.
FCV	Refer to Landscape Plans in Chapter 4 (Project Description) Figure 4.99.	Permanent loss of 76.64m of treelines (WL2) resulting in a likely, permanent, significant negative residual effect at the local geographic scale.
TPR	Refer to Landscape Plans in Chapter 4 (Project Description) Figure 4.94 and 4.95.	Permanent loss of approximately 0.01ha of scrub (WS1), 985.07m of hedgerows (WL1) and 189.95m of treelines (WL2) resulting in a likely, permanent, significant negative residual effect at the local geographic scale.
Permanent Infrastructure	This element of the Proposed Project refers to Air Valves, Line Valves, Washout Valves and Lay-Bys and Access Roads where a permanent loss of habitat will occur. Therefore, mitigation and/or replanting does not apply to these areas.	Permanent loss of KER habitats: • 0.008ha of dry-humid acid grassland (GS3) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 0.09ha of wet grassland (GS4) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 0.009ha of wet heath (HH3) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 0.02ha of wet heath and cutover bog mosaic (HH3/PB4) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 0.003ha of raised bog (PB1) resulting in a likely, permanent, significant negative residual effect at the county geographic scale.

Proposed Project Element	Proposed Mitigation and Replanting	Residual Effect
		• 0.003ha of cutover bog (PB4) (Local importance (higher value) only) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 0.06ha of cutover bog and bog woodland mosaic (PB4/WN7) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 0.0003ha of oak-ash-hazel-woodland (WN2) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 0.04ha of bog woodland (WN7) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 0.03ha of bog woodland and scrub (WN7/WS1) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 0.73ha of (mixed) broadleaved woodland (WD1) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 0.92ha of mixed broadleaved/conifer woodland (WD2) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 0.003ha of mixed broadleaved/conifer woodland and scrub (WD2/WS1) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 0.18ha of scrub (WS1) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 791.95m of hedgerows (WL1) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 856.49m of treelines (WL2) resulting in a likely, permanent, significant negative residual effect at the local geographic scale.
Raw Water Rising Main and Treated Water Pipeline	• Retention of habitats where feasible (refer to Section 8.8.2.1) • Vegetation replanting of severed habitats (refer to Section 8.8.2.1) • Reinstatement of habitats (refer to Section 8.8.2.1) The permanent loss of KER habitats will be replaced by alternative habitat types as per Section 8.8.2.1: • PB1 replaced with PB4. • PF2 replaced with high species diversity GS3. • All woodland/treeline habitats (e.g. WD1, WD2, WL2) within the 20m wide Permanent Wayleave will be replaced with mosaic planting of smaller trees, shrubs or hedges (that do not exceed 4m in height) as per Tree Protection Guidance (Uisce Éireann 2022).	Permanent loss of KER habitats: • 1.13ha of raised bog (PB1) resulting in a likely, permanent, significant negative residual effect at the county geographic scale. • 0.01ha of poor fen and flush (PF2) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 0.11ha of wet heath and raised bog mosaic (HH3/PB1) resulting in a likely, permanent, significant negative residual effect at the county geographic scale. • 2.54ha of (mixed) broadleaved woodland (WD1) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 0.04ha of (mixed) broadleaved woodland and scrub (WD1/WS1) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 0.97ha of mixed broadleaved/conifer woodland (WD2) resulting in a likely, permanent, significant negative residual effect at the local to international geographic scale. • 0.41ha of mixed broadleaved/conifer woodland and scrub (WD2/WS1) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 0.08ha of (mixed) conifer woodland (WD3) resulting in a likely, likely, permanent, significant negative residual effect at the local geographic scale. • 0.12ha of oak-ash-hazel-woodland (WN2) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 0.03ha of riparian woodland (WN5) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. • 6.27ha of bog woodland (WN7) resulting in a likely, permanent, significant negative residual effect at the local geographic scale.

Proposed Project Element	Proposed Mitigation and Replanting	Residual Effect
		14.54ha of cutover bog and bog woodland mosaic (PB4/WN7) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. 1.89ha of bog woodland and scrub (WN7/WS1) resulting in a likely, permanent, significant negative residual effect at the local geographic scale. 8,259.29m of treelines (WL2) resulting in a likely, permanent, significant negative residual effect at the local geographic scale.

8.11.2.1.2 Residual Effects in Operational Phase

1120. There are no predicted Operational Phase effects on any terrestrial habitats. Therefore, there are no required mitigation measures during the Operational Phase; however, as a precaution, hedgerows and treelines reinstated during the Construction Phase will be monitored for five years following completion to determine whether viable growth is occurring and undertake remediation works if deemed necessary. Any dead vegetation will be removed and replaced. Thus, there would be no likely significant negative residual effects on any terrestrial habitats, at any geographic scale, arising from the Operational Phase.

1121. Mitigation measures such as the use of chlorine tablets and soakaways will be implemented during the Operational Phase in the event of a local discharge to land. However, the Proposed Project will nevertheless result in temporary degradation of habitats at discharge locations listed in Table 8.78. Water would be allowed to soakaway taking into consideration local conditions at that time. Water would only be discharged to land where it is appropriate to do so. No discharge would occur during a flood event (flow rates >Q30). Where discharge occurs to land, water would be dechlorinated prior to discharge and allowed to infiltrate into the ground. Given the low magnitude of impact, the short duration of time for the discharge (over a period of days), and the rarity of the occurrence (once every 50 years), there would be no likely significant negative residual effects on any terrestrial habitats, at any geographic scale.

8.11.2.1.3 Summary of Residual Effects Upon Terrestrial Habitats

Table 8.99: Residual Effects Upon Terrestrial Habitats

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Construction Phase					
- Dry-humid acid grassland (GS3) - Wet grassland (GS4) - Wet heath (HH3) - Wet heath and cutover bog mosaic (HH3/PB4) - Wet heath and raised bog mosaic (HH3/PB1) - Wet heath and bog woodland mosaic (HH3/WN7) - Raised bog (PB1) - Cutover bog (PB4) - Cutover bog and bog woodland mosaic (PB4/WN7) - Poor fen and flush (PF2) (Mixed) broadleaved woodland (WD1) (Mixed) broadleaved woodland and scrub mosaic (WD1/WS1) - Mixed broadleaved/conifer woodland (WD2) - Mixed broadleaved/conifer woodland and scrub mosaic (WD2/WS1) - Mixed conifer woodland (WD3) - Hedgerows (WL1) - Treelines (WL2)	- Habitat loss - Habitat fragmentation - Habitat degradation - Introduction of INNS and pathogens.	- Construction activities, including excavation, storage of excavated materials, vegetation clearance and topsoil stripping would result in a loss of habitats within the Proposed Project - Permanent or temporary removal of habitats within the proposed pipeline and associated infrastructure areas during the Construction Phase may cause habitat fragmentation. Negative impacts could include impacts on movements of both plant and animal species between the fragments and seed dispersal (Benítez-Malvido and Arroyo-Rodríguez 2008) - Machinery and construction activities could introduce and disperse INNS to new areas - Excavation and tunnelling have the potential to cause habitat degradation as a result of hydrological/hydrogeological impacts within the receiving ecological environment and overland flow.	Yes	- Landscaping and replanting will be on a like-for-like basis in accordance with recommendations from an ECoW to ensure locally native species are used and will be monitored and subject to a condition assessment - Where feasible mature trees, treelines and hedgerows will be retained - Protective barriers will be used to avoid damage to adjoining woodlands outside the Proposed Project - All trees along the Proposed Project that are intended to be retained will be fenced off using the RPA as a guideline. If fencing is not feasible, hessian sacking or timber cladding will be used - Storage of hazardous materials will not be undertaken within 10m of any retained trees or hedgerows - Extensive tree cutting and lopping will be minimised - Main pipeline construction works will be carried out outside of winter period to reduce impacts towards surface and groundwater caused by sediment loading - Groundwater from trenches will be treated and recharged back to groundwater at sensitive locations - Direct discharge of untreated water from groundwater dewatering will not be allowed - Any invasive non-native plant material noted on-site will be removed off site and disposed of at an appropriate licensed waste disposal facility. Any high impact INNS found to occur within 15m of working areas will require a specialist method statement for its eradication.	Despite mitigation measures, the Proposed Project would result in a permanent loss of habitats located within the infrastructure sites and access roads. None of the habitats impacted are Annex I habitats. The habitat loss is considered to constitute a likely significant negative residual effect, at the local to international geographic scale.

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
- Oak-ash-hazel woodland (WN2) - Riparian woodland (WN5) - Bog woodland (WN7) - Bog woodland and scrub (WN7/WS1) - Scrub (WS1).					
Operational Phase					
- Dry calcareous and neutral grassland (GS1) - Dry-humid acid grassland (GS3) - Wet grassland (GS4 high local) - Raised bog (PB1) - Poor fen and flush (PF2) - Highly modified/non-native woodland (WD1, WD2, WD3, WD4) (Mixed) broadleaved woodland and scrub mosaic (WD1/WS1) - Mixed broadleaved/conifer woodland and scrub mosaic (WD2/WS1) - Hedgerows (WL1) - Treelines (WL2) - Oak-ash-hazel woodland (WN2) - Riparian woodland (WN5) - Bog woodland (WN7) - Scrub (WS1).	- Loss of terrestrial habitat - Alteration of hydrogeological conditions including potential barrier effects or land drainage.	- All potential impacts on terrestrial habitats occur during the Construction Phase and all areas (with the exception of the permanent loss areas) will be restored to pre-existing ground conditions. Landscape planting will mature in the medium to long-term, reducing the magnitude of negative effects introduced at the Construction Phase - Potential for preferential flow along the pipeline backfill material which could result in imperceptible/slight, long-term negative effects.	No	- All hedgerows and treelines reinstated during the Construction Phase will be monitored for five years following completion to determine whether viable growth is occurring and undertake remediation works if deemed necessary. Any dead vegetation will be removed and replaced - There is no potential impact to any terrestrial habitats predicted during the Operational Phase, therefore there are no further mitigation measures required.	No likely significant negative effects on any terrestrial habitats are predicted during the Operational Phase; therefore, the Proposed Project would not result in likely significant negative residual effects, at any geographic scale.

8.11.2.2 Mammals – Bats

8.11.2.2.1 Residual Effects in Construction Phase

1122. Mitigation measures will be implemented during the Construction Phase to reduce the effects of habitat loss, disturbance, and risk of mortality. However, the Proposed Project would still result in a permanent loss of five bat roosts: a lesser horseshoe bat satellite night roost and Natterer's bat/brown long-eared bat daytime roost within a derelict building (Building 1), as well one soprano pipistrelle day roost at the RWI&PS site and three tree roosts (day and satellite) for Natterer's bat and common and soprano pipistrelle. Mitigation measures propose the construction of a new bat roost building at Parteen Woodland. This bat roosting building will carefully follow the specifications and principles outlined in Section 8.8.2.2. With the erection of this new bat roosting building and all other mitigation measures detailed in Section 8.8.2.2, the Proposed Project would still result in a short-term likely significant residual effect at a local level.

1123. Construction activities associated with vegetation removal and hedgerow/treeline removal could potentially cause bat roost isolation and fragmentation of established commuting and foraging corridors. This may permanently or temporarily alter or deter bats from using commuting corridors and gaining access to foraging habits (Entwistle *et al.* 2001). Without appropriate mitigation measures in place, such impacts could cause direct and significant negative effects on bats. However, with the proposed mitigation measures in place (Section 8.8.2.2) it is predicted that the Proposed Project would result in short-term, likely significant negative residual effects, at a local geographic scale.

1124. Mitigation measures will be implemented to ensure that lighting during construction would not significantly affect bats. Therefore, the Proposed Project would not result in any likely significant residual effects due to lighting on any bat species.

8.11.2.2.2 Residual Effects in Operational Phase

1125. Mitigation measures in the form of replanting and minimised and directional lighting will be implemented and monitored during the Operational Phase. These measures will ensure that, during operation, the Proposed Project would not result in a significant negative effect on the local bat population as a result of disturbance displacement. Therefore, there are no likely significant negative residual effect on bats, at any geographic scale.

8.11.2.2.3 Summary of Residual Effects Upon Bats

Table 8.100: Residual Effects Upon Bats

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual effect
Construction Phase					
Common pipistrelle	- Habitat loss (including roosting habitat) - Habitat fragmentation or displacement and/or damage - Loss of prey - Disturbance/displacement - Mortality or injury.	- There would be a loss of five known bat roosts during the construction of the Proposed Project. These roosts include one lesser horseshoe night roost, one soprano pipistrelle day roost, one Natterer's bat day roost, and two satellite roosts for common and soprano pipistrelles - There is potential for disturbance to roost(s) during the Construction Phase. Disturbance effects could result in the permanent abandonment of a roost - Construction activities would cause habitat fragmentation (for commuting and foraging bats) and potential isolation of bat roosts through the removal of hedgerows and treelines. There is also the potential for a reduction of available invertebrate prey resource in the short-term - Lighting and noise impacts and an increase in human activity during the Construction Phase - Cumulative stress could lead to roost abandonment and/or mortality and a reduction in population numbers.	Yes	- The route of the Proposed Project was carefully selected to avoid as many areas of potentially high bat activity as possible - Hedgerows, treelines and mature trees that are located directly adjacent to the Proposed Project and that are not directly impacted will be avoided and retained intact - Where the presence of a bat tree roost has been confirmed and felling of the tree cannot be avoided, the following measures will be undertaken: - The bats will be relocated by a licensed bat specialist and the NPWS will be informed - Trees identified as PBR and proposed to be felled will be re-surveyed at least one month prior to felling - Alternative roosting sites (i.e. bat boxes) will be erected six months prior to tree felling - Trees proposed to be removed will be felled on mild days - Given the need to remove five roosts and the impacts on bats that are predicted for the Proposed Project, a derogation licence under Section 54 of S.I. 477 of 2011 will be required. The Bat Derogation Licence application is included in Appendix A8.24 - Mature trees in need of removal that have been identified as having a moderate to high potential for bat roosts will be felled from late August to early November in order to avoid any breeding population	Despite the mitigation measures, there would still be a permanent loss of five bat roosts. As one new alternative bat roost building will be constructed within the vicinity of the original roosts, the effect would be a short-term, likely significant negative residual effect, at a local geographic scale. Construction activities associated with vegetation removal would potentially cause habitat loss and fragmentation impacts on bat populations. With appropriate mitigation measures in place, it is likely that the Proposed Project would still result in short-term likely significant residual negative effects at a local geographic scale. During pre-construction surveys, in the event that new bat roosts are identified within the ZoI of the Proposed Project that would need to be removed or disturbed and cannot be mitigated for, a new derogation licence under Section 54 of S.I. 477 of 2011 will be required.
Soprano pipistrelle					
Leisler's bat					
Daubenton's bat					
Natterer's bat					
Whiskered bat					
Nathusius' pipistrelle					
Brown long-eared bat					
Lesser horseshoe bat					

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual effect
				- Vegetation replanting will be aimed at increasing species diversity to help support insect life and bat prey - Where the proposed construction works will result in the destruction of bat roosts, the following mitigation measures will be followed: - One alternative bat roost (in the form of a bat house) is required to be built near the WTP, at least one year prior to tree and building removal - An NPWS licence will be required for these works - Bat house building specifications and principles will be followed as per Section 8.8.2.2.6 - Bat boxes will be erected under the supervision of a bat specialist and seasonal inspections will take place for a minimum of two years (excluding mid-June to mid-August) - Lighting for the construction of the Proposed Project will be restricted in areas of high bat activity and near confirmed /potential roosting sites - Essential lighting will be minimised through directional lighting - All lighting will be restricted to working hours - A bat specialist will check the lighting pattern once assembled and make recommendations regarding perimeter lux levels - To minimise disturbance caused by construction at watercourse crossings, works will cease at sunset in these areas and replanting of riparian habitats will commence once works have been completed in the area - Where construction is taking place in close proximity to a known roost or an important commuting corridor/ foraging area, works will cease before sunset.	

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual effect
Operational Phase					
Common pipistrelle	Disturbance/displacement	- An increased human presence at the RWI&PS, WTP, BPT, BPS, FCV and TPR may cause disturbance to bats foraging in these areas and potentially change flight patterns. However, most human activity is expected during the daylight hours - All infrastructure would be lit at night resulting in potential for disturbance to bats.	Yes	- Lighting will be minimised at the RWI&PS, WTP, BPT, BPS, FCV and TPR especially at areas of interest for bat species - Directional lighting will be used to prevent overspill - Monitoring will take place post construction by an experienced bat specialist and will involve: - Monitoring of the bat house within one year of construction for a minimum of three years post construction. Register bat house with BCIreland - Inspection of bat boxes within one year of erection. Register box schemes with BCIreland. This will be undertaken for a minimum of two years - A full summer bat survey will be undertaken post works, over a period of five years to monitor any other bat mitigation	Mitigation measures will be implemented (and monitored) to ensure that, during operation, the Proposed Project would not result in a significant negative effect on the local bat population as a result of disturbance displacement. Therefore, there are no likely significant negative residual effects on bats, at any geographic scale.
Soprano pipistrelle					
Leisler's bat					
Daubenton's bat					
Natterer's bat					
Whiskered bat					
Nathusius' pipistrelle					
Brown long-eared bat					
Lesser horseshoe bat					

8.11.2.3 Mammals – Eurasian Badger

8.11.2.3.1 *Residual Effects in Construction Phase*

1126. Mitigation measures will be implemented during the Construction Phase which would minimise the effects of habitat loss, disturbance, and risk of mortality. The Proposed Project would nevertheless result in a permanent loss of 33 setts (18 active and 15 inactive) of which two were main setts. With the proposed mitigation measures applied and the exclusion of badger setts and/or construction of artificial sett(s) in advance of construction, there would be a short-term, likely significant negative residual effect, at a local geographic scale.

8.11.2.3.2 *Residual Effects in Operational Phase*

1127. There would be permanent loss of habitat for this species within the RWI&PS, WTP, BPT, BPS, FCV and the TPR sites. Mammal-resistant or mammal-proof fencing with locked gates will be erected around the perimeters of these infrastructure sites as a security measure, which would cause habitat fragmentation; however, the fencing will enclose small areas of land and will not fragment badger territories or setts or foraging/commuting routes. Furthermore, due to the widespread population of this mammal, their broad habitat preferences, and the extensive areas of suitable foraging habitat in the wider surrounding, as well as the habitat which will be reinstated above the Treated Water Pipeline following the completion of the works, it is not predicted that this impact would be significant, even at a local geographic scale. Therefore, there are no likely significant negative residual effects on badger, at any geographic scale.

8.11.2.3.3 Summary of Residual Effects Upon Eurasian Badger

Table 8.101: Residual Effects Upon Badger

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Construction Phase					
Badger	- Habitat loss - Habitat fragmentation or displacement and/or damage - Disturbance/ displacement - Mortality or injury.	- Loss of setts within the Proposed Project - Habitat loss and/or habitat fragmentation causing displacement or loss of available habitat for foraging - Disturbance associated with noise, vibration, physical presence, or night-time lighting associated with construction activities and staff undertaking works - Risk of mortality or injury associated with vegetation removal and construction activities.	Yes	- Pre-construction surveys will be undertaken to identify any new setts within the Proposed Project. This will inform site clearance activities and in turn will minimise the risk of mortality - No machinery will be used within 30m of a sett or within 50m during the breeding season. A qualified ECoW will supervise all works within 30m of an active sett. Pile driving (at RWI&PS) will not take place within 150m of active setts. Pile driving is not advised during the breeding season. If required it will be done under the supervision of an ECoW. This will ensure that there is no accidental damage to setts - Fencing and appropriate signage will be used along the Proposed Project to demarcate prohibited working areas to minimise noise and vibration disturbance - Setts that require exclusion and/or destruction will be carried out as per NRA guidelines and under the supervision of a suitably qualified ECoW. The correct sett closure and destruction techniques will minimise the risk of mortality while destruction is being carried out - Night-time working will be restricted and will not be carried out within 150m of a sett - Spoil heaps will be situated at least 20m away from a sett. This will reduce the risk of habitat loss and fragmentation.	With the implementation of mitigation measures the risk of injury or mortality would be avoided. However, the Proposed Project would result in the permanent loss of 33 setts, and therefore there would be a short-term, likely significant negative residual effect, at a local geographic scale.

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Operational Phase					
Badger	- Habitat loss and fragmentation - Disturbance	- Habitat loss and/or habitat fragmentation causing displacement or loss of available habitat for foraging, associated with the high-fenced perimeters which would be put in place around the permanent infrastructure sites as a security measure. - Disturbance (noise and physical presence) impacts associated with inspections of the 20m wide Permanent Wayleave and valves and general repair and maintenance.	No	- The construction of an artificial sett within the 20m wide Permanent Wayleave may be proposed – this is dependent on the pre-construction surveys. - The mammal-resistant fencing will be buried into the ground and will aim to guide badgers safely around the site. The fencing will be designed as per the NRA guidelines (NRA 2006d).	There would be permanent habitat loss and fragmentation within the RWI&PS, WTP, BPT, BPS, FCV and the TPR. However, due to the widespread population of this species and given that there are extensive areas of suitable foraging habitat in the wider surroundings, it is not predicted that this impact would be significant, even at a local geographic scale. Therefore, the Proposed Project would not result in likely significant negative residual effects on badger, at any geographic scale.

8.11.2.4 Mammals – Otter

8.11.2.4.1 *Residual Effects in Construction Phase*

1128. Mitigation measures will be implemented during the Construction Phase which would minimise the effects of habitat loss, disturbance, and risk of mortality. Given the wide range of suitable habitat and the temporary nature of the Construction Phase, as well as the implementation of the proposed mitigation measures, the Proposed Project would not result in any likely significant negative residual effects on otter, at any geographic scale.

8.11.2.4.2 *Residual Effects in Operational Phase*

1129. Mitigation measures will be implemented during the Operational Phase to ensure that the Proposed Project would not result in a significant negative effect on the local otter population as a result of habitat loss and fragmentation associated with the Proposed Project.

1130. There would be permanent habitat loss and fragmentation associated with the RWI&PS, WTP, BPT, BPS, FCV and the TPR. However, given there are extensive areas of suitable alternative foraging habitat in the wider surroundings, there are no likely significant negative residual effects, even at a local geographic scale.

1131. Reduction in water level due to water abstraction could result in alteration of the distribution and abundance of suitable otter foraging habitat around margins of Parteen Basin. However, a hydrological model analysis was carried out to examine the difference between pre-work (recorded) and post-work (simulated) water levels in Lough Derg and Parteen Basin as a result of water supply abstraction. It was found, throughout the years analysed, the water levels would have remained within the Normal Operating Band on Lough Derg and within the upper and lower water levels that ESB apply to Parteen Basin, and the statutory compensatory flow over Parteen Weir would have been provided. Therefore, there would be no significant negative effect on local otter populations, and thus, the Proposed Project would not result in a likely significant negative residual effect on otter, at any geographic scale.

1132. Furthermore, there will be no impacts to otter prey during the Operational Phase as potential mortality or injury of aquatic species has been minimised through design measures (further detail is provided in Section 8.7.3.2.3). Therefore, there would be no indirect significant negative residual effect on otter, at any geographic scale.

8.11.2.4.3 Summary of Residual Effects Upon Otter

Table 8.102: Residual Effects Upon Otter

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Construction Phase					
Otter	- Habitat loss - Habitat fragmentation - Habitat degradation - Disturbance/displacement - Mortality or injury	- Habitat loss of breeding or resting sites, or riparian habitat for commuting and foraging - Habitat fragmentation associated with temporary physical obstructions in the water (where a watercourse is crossed by open trench rather than trenchless techniques) causing displacement or loss of available habitat for foraging - Reduction in water quality and associated habitat degradation and loss or reduction of available food resources - Disturbance associated with noise and vibration - Risk of mortality or injury associated with construction activities.	Yes	- Given the need to disturb three holts and the impacts on otter that are predicted for the Proposed Project, a derogation licence under Section 54 of S.I. 477 of 2011 will be required. The Otter Derogation Licence application is included in Appendix A8.25 - Pre-construction surveys will be undertaken to identify any new holts/couches within the Proposed Project. This will inform site clearance activities and in turn will minimise the risk of mortality - Fencing and appropriate signage will be used along the Proposed Project to demarcate prohibited working areas to minimise noise and vibration disturbance - All watercourse crossings will be carried out in accordance with the requirements of IFI as set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), or as otherwise agreed with IFI during the Construction Phase, and will be monitored by a suitability qualified ECoW on a daily basis to ensure compliance; and that maintenance of any attenuation and sediment and erosion control measures (e.g. hydrocarbon interceptors and silt traps) are carried out as required.	With the implementation of mitigation measures negative impacts on otter would be reduced or avoided, and the Proposed Project would not result in a significant negative effect on the local otter population. Therefore, the Proposed Project would not result in a likely significant negative residual effect on otter, at any geographic scale. During pre-construction surveys, in the event that new otter holts are identified within the Zol of the Proposed Project that would need to be removed or disturbed and cannot be mitigated for, a new derogation licence under Section 54 of S.I. 477 of 2011 will be required.

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Operational Phase					
Otter	- Habitat loss and fragmentation - Disturbance	- Habitat loss and/or habitat fragmentation causing displacement or loss of available habitat for foraging, associated with the high-fenced perimeters which would be put in place around the permanent infrastructure sites as a security measure - Disturbance (noise and physical presence) impacts associated with inspections of the 20m wide Permanent Wayleave and valves and general repair and maintenance.	No	- Mammal-resistant fencing will be buried into the ground and will aim to guide otters safely around the site. The fencing will be designed as per the NRA guidelines (NRA 2008a) - Quarterly monitoring will be carried out over a period of at least one year to ensure mitigation measures are effective.	There would be a permanent habitat loss and fragmentation within the RWI&PS, WTP, BPT, BPS, FCV and the TPR. However, due to the widespread population of this species and given that there are extensive areas of suitable foraging habitat in the wider surroundings, it is not predicted that this impact would be significant, even at a local geographic scale. Therefore, the Proposed Project would not result in likely significant negative residual effects on otter, at any geographic scale.

8.11.2.5 Mammals – Other Mammal Species

1133. Other mammal species include Irish hare, pine marten, fallow deer, red squirrel and hedgehog. These were infrequently recorded within the Proposed Project and wider surroundings. It is considered likely that these species regularly occur and are widely distributed throughout the Proposed Project.

8.11.2.5.1 *Residual Effects in Construction Phase*

1134. Although there are no known exclusion measures from breeding sites for these species, the implementation of seasonal vegetation clearance is proposed. This mitigation will avoid the breeding season for most small mammal species (Hayden & Harrington 2001), however, due to the nocturnal nature of these species there may still be a risk of mortality or injury associated with vegetation removal and construction activities.

1135. Given the wide range of suitable habitat and the temporary nature of the Construction Phase, it is likely that the populations of these species would remain stable, and the risk of mortality would be low. It is not predicted that these effects would be significant, even at a local geographic scale. Therefore, the Proposed Project would not result in a likely significant negative residual effect on other mammals, at any geographic scale.

8.11.2.5.2 *Residual Effects in Operational Phase*

1136. There would be permanent habitat loss for these species within the RWI&PS, WTP, BPT, BPS, FCV and the TPR. Mammal-resistant or mammal-proof fencing with locked gates will be erected around the perimeters of these infrastructure sites as a security measure, which would cause habitat fragmentation; however, the fencing will enclose small areas of land and will not fragment important resting/breeding sites or foraging/commuting routes. Furthermore, due to the widespread populations of these mammals, their broad habitat preferences, and/or the extensive areas of suitable foraging habitat in the wider surroundings, as well as the habitat which will be reinstated above the Treated Water Pipeline following the completion of the works, it is not predicted that this impact would be significant even at a local geographic scale. Therefore, the Proposed Project would not result in a likely significant negative residual effect on other mammal species, at any geographic scale.

8.11.2.5.3 Summary of Residual Effects Upon Other Mammal Species

Table 8.103: Residual Effects Upon Other Mammal Species

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Construction Phase					
Other Mammal Species	- Habitat loss - Habitat fragmentation - Habitat degradation - Disturbance/displacement - Mortality or injury.	- Loss of breeding habitats within the Proposed Project - Habitat loss and/or habitat fragmentation causing displacement or loss of available habitat for foraging - Disturbance associated with noise, vibration, physical presence, or night-time lighting associated with construction activities and staff undertaking works - Risk of mortality or injury associated with vegetation removal and construction activities.	No	As there is no known method for excluding small mammal species, vegetation clearing works will take place between September and February inclusive as far as practicable. This would avoid the majority of the main breeding season for most small mammal species (Hayden & Harrington 2001).	Given the wide range of suitable alternative habitat in the surrounding areas and the temporary nature of the Construction Phase, as well as the implementation of mitigation measures, it is not predicted that these effects would be significant, even at a local geographic scale. Therefore, the Proposed Project would not result in a likely significant negative residual effect on other mammals, at any geographic scale.
Operational Phase					
Other Mammal Species	- Habitat loss and fragmentation - Disturbance.	- Habitat loss and fragmentation associated with the high-fenced perimeters which would be put in place around the permanent infrastructure sites as a security measure - Disturbance (noise and physical presence) impacts associated with inspections of the 20m wide Permanent Wayleave and valves and general repair and maintenance.	No	The mammal-resistant fencing will be buried into the ground and will aim to guide all mammals safely around the site. The fencing will be designed as per the NRA guidelines (NRA 2008a; 2006d).	There would be a permanent habitat loss and fragmentation within the RWI&PS, WTP, BPT, BPS, FCV and the TPR. However, due to the widespread populations of these species and given that there are extensive areas of suitable foraging habitat in the wider surroundings, it is not predicted that this impact would be significant even at a local geographic scale. Therefore, the Proposed Project would not result in likely significant negative residual effects on other mammals, at any geographic scale.

8.11.2.6 Invertebrates – Lepidoptera and Molluscs

8.11.2.6.1 Residual Effects in Construction Phase

1137. With regard to marsh fritillary, mitigation measures will be implemented during the Construction Phase which would avoid the risk of the Proposed Project affecting areas with suitable marsh fritillary habitat. Areas with devil's-bit scabious will be retained and fencing will be used to protect it from site clearance works. Pre-construction marsh fritillary larval web surveys will be undertaken. If larval webs are present within the Proposed Project, they will be translocated to suitable habitat outside of the working area that will remain unaffected by construction works. Therefore, the Proposed Project would not result in a likely significant negative residual effect on the marsh fritillary butterfly, at any geographic scale.

1138. The rare Red Listed mollusc species, Lilljeborg's whorl snail and brown snail, which were recorded at the RWI&PS site, will be translocated to suitable alternative habitat outside of the working area in advance of construction. Therefore, the Proposed Project would not result in a likely significant negative residual effect on these species, at any geographic scale.

1139. No individuals or suitable habitat for Annex II *Vertigo* species was recorded within the ZoI of the Proposed Project therefore the Proposed Project would not impact on any populations of the three Annex II *Vertigo* species.

8.11.2.6.2 Residual Effects in Operational Phase

1140. No likely significant negative effects on marsh fritillary or mollusc species are predicted during the Operational Phase and no mitigation measures are required. The Proposed Project would not result in a likely significant negative residual effect on marsh fritillary or mollusc species, at any geographic scale.

8.11.2.6.3 Summary of Residual Effects Upon Invertebrates

Table 8.104: Residual Effects Upon Invertebrates

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Construction Phase					
Marsh fritillary	- Habitat loss - Risk of mortality	- Temporary loss of marsh fritillary habitat - Risk of mortality of individuals within local populations as a direct result of construction activities and site clearance works within the Proposed Project.	Yes	- Areas with suitable habitat for this species were avoided, where feasible, during the route selection process. Areas where devil's-bit scabious was recorded will be retained and fencing will be used to protect them from construction activities. - Pre-construction marsh fritillary larval web surveys will be undertaken. If larval webs are present within the Proposed Project, they will be translocated to suitable habitat outside of the working area that will remain unaffected by construction works	Mitigation will be implemented during construction to avoid any marsh fritillary mortality during site clearance works. No other likely significant effects on the marsh fritillary butterfly are predicted during construction. Therefore, the Proposed Project would not result in likely significant negative residual effects on the marsh fritillary butterfly, at any geographic scale.

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Operational Phase					
Marsh fritillary	No impacts	There are no activities during the Operational Phase that would impact any marsh fritillary habitat or species.	No	No likely significant negative effects on marsh fritillary are predicted during the Operational Phase and no mitigation measures are required.	The Proposed Project would not result in likely significant negative residual effects on the marsh fritillary butterfly, at any geographic scale.
Construction Phase					
Mollusc species (Lilljeborg's whorl snail and brown snail)	- Habitat loss - Risk of mortality	- Permanent loss of habitat at the RWI&PS site - Risk of mortality of individuals within local populations as a direct result of construction activities and site clearance works at the RWI&PS site.	Yes	Lilljeborg's whorl snail and brown snail will be collected from within the RWI&PS site and transferred to alternative suitable habitat outside of the working area in advance of construction. For brown snail, monitoring will be carried out to check for the presence of this snail prior to releasing collected specimens, and then sampling of the recipient site after three and six years to gather information on the success of the introduction.	Mitigation will be implemented during construction to avoid any Lilljeborg's whorl snail and brown snail mortality during site clearance works. No other likely significant effects on these species are predicted during construction. Therefore, the Proposed Project would not result in likely significant negative residual effects on Lilljeborg's whorl snail and brown snail at any geographic scale.
Operational Phase					
Mollusc species (Lilljeborg's whorl snail and brown snail)	No impacts	There are no activities during the Operational Phase that would impact any mollusc species.	No	No likely significant negative effects on mollusc species are predicted during the Operational Phase and no mitigation measures are required.	The Proposed Project would not result in likely significant negative residual effects on mollusc species, at any geographic scale.

8.11.2.7 Other Species Groups – Reptiles and Amphibians

8.11.2.7.1 Residual Effects in Construction Phase

1141. Mitigation measures will be implemented during site clearance works to minimise the mortality risk, and to minimise the effects of habitat loss on the common frog and smooth newt populations. Therefore, the Proposed Project would not result in a likely significant negative residual effect on the common frog or smooth newt, at any geographic scale.

8.11.2.7.2 Residual Effects in Operational Phase

1142. There are no potential impacts on these species as a result of the Operational Phase of the Proposed Project. Therefore, no mitigation measures are required, and there would be no likely significant residual effects on these species, at any geographic scale.

8.11.2.7.3 Summary of Residual Effects Upon Other Species – Reptiles and Amphibians

Table 8.105: Residual Effects Upon Reptiles and Amphibians

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Construction Phase					
Common Frog	- Habitat loss - Risk of mortality	- Site clearance works would result in the temporary and permanent loss of wet grassland habitats within the Proposed Project - If site clearance works occur during the frog breeding season (February to April inclusive) then frogs and/or frog spawn could be present resulting in the mortality of individuals within local populations.	Yes	Pre-construction surveys will be carried out prior to any in-stream works during the season where frogspawn/tadpoles may be present. Removal of this species under licence from the NPWS will be carried out if necessary.	Mitigation will be implemented during site clearance works to minimise the mortality risk, and to minimise the effects of habitat loss on the local common frog population as a result of the Proposed Project. This would ensure that construction of the Proposed Project would not have any long-term effects or affect the integrity of these amphibian species. Therefore, the Proposed Project would not result in likely significant negative residual effects on the common frog, at any geographic scale.
Operational Phase					
Common Frog	No impacts	There are no activities during the Operational Phase that would impact any common frog habitat or species.	No	No likely significant negative effects on common frog are predicted during the Operational Phase and no mitigation measures are required.	The Proposed Project would not result in likely significant negative residual effects on the common frog, at any geographic scale.
Construction Phase					
Smooth Newt	- Habitat loss - Risk of mortality	- Site clearance works would result in the temporary and permanent loss of wet grassland habitats within the Proposed Project - If site clearance works occur during the newt breeding season (early spring) then newts and/or newt eggs could be present resulting in the mortality of individuals within local populations.	Yes	Pre-construction surveys will be carried out prior to any in-stream works during the season early spring when newts are known to breed. Removal of this species under licence from the NPWS can be carried out if necessary.	Mitigation will be implemented during site clearance works to minimise the mortality risk, and to minimise the effects of habitat loss on the local smooth newt population as a result of the Proposed Project. This would ensure that construction of the Proposed Project would not have any long-term effects or affect the integrity of these amphibian species. Therefore, the Proposed Project would not result in likely significant negative residual effects on the smooth newt, at any geographic scale.
Operational Phase					
Smooth Newt	No impacts	There are no activities during the Operational Phase that would impact any smooth newt habitat or species.	No	No likely significant negative effects on smooth newt are predicted during the Operational Phase and no mitigation measures are required.	The Proposed Project would not result in likely significant negative residual effects on the smooth newt, at any geographic scale.

8.11.3 Aquatic Ecology

1143. Residual effects on aquatic ecology have been assessed in respect of individual Key Ecological Receptors.

8.11.3.1 Lower River Shannon SAC

8.11.3.1.1 *Residual Effects in Construction Phase*

1144. Construction Phase impacts include increased sediment loading, habitat destruction and degradation and noise and vibration disturbance. Mitigation measures will be implemented prior to and during construction works, however, after these measures have been put in place there would still be a permanent loss of 0.55ha of terrestrial habitat along the bank of Parteen Basin, within the boundaries of the Lower River Shannon SAC, to allow the construction of the RWI&PS. The RWI&PS would be located along the eastern banks of Parteen Basin. This area does not contain any suitable spawning habitat for protected species, any other holts or couches nor does it contain any Annex I habitats. Therefore, the Proposed Project would not result in any likely significant negative residual effects at any geographic scale.

8.11.3.1.2 *Residual Effects in Operational Phase*

1145. There are no potential significant effects on the Lower River Shannon SAC arising from the Proposed Project Operational Phase; therefore, no mitigation measures are required, and no likely significant residual effects are predicted.

8.11.3.2 Watercourses (FW1, FW2, FW3, FW4)

8.11.3.2.1 *Residual Effects in Construction Phase*

1146. The main impacts on these KERs during the Construction Phase are habitat loss, habitat degradation as a result of suspended solids and/or pollution, and the introduction and spread of INNS. With the successful implementation of appropriate mitigation measures, all impacts imposed on these KERs would be minimised. Therefore, the Proposed Project would not result in any likely significant residual effects on watercourses, at any geographic level.

8.11.3.2.2 *Residual Effects in Operational Phase*

1147. The main impacts for this KER during the Construction Phase are habitat loss and degradation. With the successful implementation of appropriate mitigation measures, all Operational Phase impacts imposed on these KERs would be minimised. Therefore, the Proposed Project would not result in any likely significant residual effects on watercourses, at any geographic level.

8.11.3.3 Aquatic Species

1148. White-clawed crayfish, Atlantic salmon, lamprey species, eel, and other fish species have been evaluated as the aquatic species KERs. Each of these species face similar impacts arising from both the Construction and Operational Phases of the Proposed Project.

8.11.3.3.1 *Residual Effects in Construction Phase*

1149. Construction Phase impacts on these species are habitat loss, habitat degradation as a result of suspended solids and/or pollution, habitat degradation as a result of hydrological impacts, disturbance/displacement, the introduction and spread of INNS, and direct mortality. Mitigation measures will also be implemented to minimise the potential for mortality of fish species during construction, such that no population level effects are predicted. With the correct implementation of the mitigation measures outlined above, the Proposed Project Construction Phase would not result in a likely significant negative residual effect on these species.

8.11.3.3.2 *Residual Effects in Operational Phase*

1150. Operational Phase impacts on these species include disturbance and displacement associated with noise from the water pumps in Parteen Basin and mortality or injury associated with intake pumps. Design underwater noise modelling of the operational noise of water pumps has been carried out (Appendix A8.20: Underwater Noise Modelling Report). The results of this modelling were analysed using criteria set out by Popper *et al.* (2014) to assess the likely impact on fish in the area. Noise levels from operational pumps were not expected to exceed the criteria within Popper *et al.* (2014). Potential avoidance from aquatic species is noted, however, this is only expected to occur close to the RWI site. The noise levels are expected to reach minimum recorded background levels in Parteen Basin within 550m of the water intake when operating at the maximum abstraction rate. Therefore, the Proposed Project Operational Phase would not result in a likely significant residual effect on these species at any geographic scale.

1151. The impacts caused by potential mortality and injury towards aquatic species have been minimised through design measures. Each water intake point would be fitted with a PWWC intake screen and bubble curtain at the inlet openings which would prevent fish, eels and debris from entering the pumping station. The velocity of the intake screens would be limited to 0.15m/s to allow juvenile fish to swim away without becoming trapped. As a result of these design phase measures, it is expected that there would be no risk of mortality to aquatic KERs in Parteen Basin during the Operational Phase and therefore, no likely significant negative residual effects, at any geographic scale.

8.11.3.3.3 Summary of Residual Effects Upon Aquatic Ecology

Table 8.106: Residual Effects Upon Aquatic Ecology

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Construction Phase					
Lower River Shannon SAC	- Habitat loss and habitat degradation - Increased sediment loading or pollution - Introduction and/or spread of INNS - Disturbance.	- Construction of the RWI&PS would require the removal of a section of the existing bank around Parteen Basin and temporary disturbance to the bed of the basin. No suitable spawning habitat for protected species was recorded at the RWI&PS site during the aquatic ecological survey - Silt-laden water runoff, leading to increased sediment loading in nearby watercourses from activities such as ground disturbance - Without appropriate mitigation measures in place, construction activities at the RWI&PS at Parteen Basin have the potential to cause increased sediment loading and pollution which could result in likely significant negative effects on aquatic flora and fauna in Parteen Basin and downstream in the Old River Shannon - Without appropriate mitigation measures in place, construction activities have the potential to introduce and/or spread INNS which could result in likely significant negative effects on flora and fauna in the receiving environments - Although none of the qualifying interests of the Lower River Shannon SAC were recorded within the RWI&PS, construction activities may cause indirect disturbance effects on protected aquatic fauna in Parteen Basin.	Yes	- All construction works will be in accordance with IFI guidelines (IFI 2016) or as otherwise agreed with IFI during the Construction Phase - The use of secant piling within Parteen Basin to act as a barrier between the water and construction activities - The use of a concrete revetment mat to reduce erosion effects on Parteen Basin bed - A double row of heavy-duty Type 3 silt curtains will be used during the installation and removal of the temporary piling platform within Parteen Basin. This area will also be electrofished to remove any fish that may have become enclosed between the curtain and the platform - Refuelling 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 - Prior to arrival on-site and before leaving site, all plant and equipment will be thoroughly cleaned down using a power washer in a contained area - All staff working on-site will be briefed on the presence of INNS in the area and the guidelines associated with their management - To mitigate the potential spread of zebra mussels, microfilters will be fitted to the rising main - Works will be monitored daily by a suitably qualified ECoW to ensure all mitigation is working correctly.	After the implementation of mitigation measures there would still be a loss of 0.55ha habitat along the banks of Parteen Basin for the RWI. This area does not contain any suitable spawning habitat for protected species, nor does it contain any Annex I habitats, therefore the Proposed Project would not result in any likely significant negative residual effects at any geographic scale.

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Operational Phase					
Lower River Shannon SAC	- Habitat loss - Habitat degradation as a result of pollution - Habitat degradation as a result of hydrological impacts - Disturbance.	- Removal of a section of the existing bank around Parteen Basin - Surface water runoff would be diverted into the SuDS system within the RWI&PS. Wastewater would be diverted into a holding tank and would be tankered to a WwTP, therefore pollution impacts on the Lower River Shannon SAC during the Operational Phase are not likely to occur - The hydrological model and water quality model suggest water abstraction from Parteen Basin would not significantly change the current hydrology, water quality or geomorphology of Lough Derg and Parteen Basin, and the compensation flow to the Old River Shannon - Noise levels from operational water pumps are not predicted to exceed the Popper <i>et al.</i> (2014) criteria for continuous noise.	No	No likely significant negative effects on the Lower River Shannon SAC are predicted during the Operational Phase and no mitigation measures are required.	The Proposed Project would not result in a likely significant negative residual effect on the Lower River Shannon SAC, at any geographic scale.
Construction Phase					
Watercourses (FW1, FW2, FW3) ranked as being of 'high ecological value' (Appendix A8.14: Watercourse Crossing Data)	- Habitat loss and habitat degradation - Increased sediment loading or pollution - Introduction and/or spread of INNS.	- The potential effects on aquatic flora and fauna as a result of trenchless construction are expected to be minimal with no in-stream works required and the locations for drill rig positioning and pipeline pull areas chosen or engineered such that the fall is away from the water body. However, there may be potential for local removal of some riparian vegetation - Movement of machinery/plant over surface water crossings and the placement of temporary bridges could result in a reduction in water quality through the introduction of pollution, potentially affecting the aquatic environment and consequently aquatic fauna at and downstream of the crossings - Potential impacts associated with open trench construction include removal of and disturbance to in-stream and riparian habitats and increased sediment loading and pollution - In addition, construction activities have the potential to introduce or spread INNS which could result in likely significant negative	Yes	- All construction works will be in accordance with IFI guidelines (IFI 2016) or as otherwise agreed with IFI during the Construction Phase - Before entering and leaving site, all plant and equipment will be thoroughly cleaned down using a power washer in a contained area - All staff working on-site will be briefed on the presence of INNS in the area and the guidelines associated with their management - The use of trenchless techniques for crossing watercourses with the Proposed Project pipeline - Excavated material and spoil heaps will be located a minimum 10m from the banks of the watercourse - Silt fencing will be placed downslope of the spoil heaps	Mitigation measures will be implemented prior to all construction works to minimise the risk of the Proposed Project affecting water quality in these watercourses and to ensure the existing groundwater regime is not affected. Mitigation measures will also be in place to protect the existing riparian and in-stream habitats so that disturbance is minimised, and they are reinstated to the same condition or better. Therefore, the Proposed Project would not result in any likely significant residual effects on these watercourses, at any geographic scale.

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
		effects on flora and fauna in the receiving environments in the absence of appropriate mitigation measures.		- Watercourse crossings works, including preparatory works will be supervised by an ECoW - Temporary bridging will incorporate silt control fencing to prevent loose material spilling from construction vehicles gaining access to the watercourses - After all trenchless crossings are complete the site will be cleaned, and all waste will be disposed of at a licensed facility - Once pipes have been placed, they will be pressure tested and hydrostatically tested to eliminate the risk of contaminated water release if a section fails - Works will be monitored daily by a suitably qualified ECoW to ensure all mitigation is working correctly.	
Watercourses (FW1, FW2, FW4) ranked as being of 'medium ecological value'. (Appendix A8.14: Watercourse Crossing Data)		The potential effects on aquatic flora and fauna as a result of trenchless construction are expected to be minimal with no in-stream works required and the locations for drill rig positioning and pipeline pull areas chosen or engineered such that the fall is away from the water body. However, there may be potential for local removal of some riparian vegetation		All construction works will be in accordance with IFI guidelines (IFI 2016) or as otherwise agreed with IFI during the Construction Phase	
Watercourses (FW1, FW2, FW4) ranked as being of 'low ecological value'. (Appendix A8.14: Watercourse Crossing Data)		- Removal of in-stream habitats and a potential increase in sediment loading and/or pollution during the Construction Phase could negatively impact protected aquatic flora and fauna within and downstream of the Proposed Project - Movement of machinery/plant over surface water crossings and the placement of temporary bridges could result in a reduction in water quality through the introduction of pollution, potentially affecting the aquatic environment and consequently aquatic fauna at and downstream of the crossings - Potential impacts associated with open trench construction include removal of and		- Before entering and leaving site, all plant and equipment will be thoroughly cleaned down using a power washer in a contained area - All staff working on-site will be briefed on the presence of INNS in the area and the guidelines associated with their management - Excavated material and spoil heaps will be located a minimum 10m from the banks of the watercourse - Sediment trap/Sedimat™ will be located directly downstream - Silt fencing will be placed downslope of the spoil heaps - Silt bags will be used for overpumping methods to allow sediment removal prior to being discharged back into the watercourse	

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
		disturbance to in-stream and riparian habitats and increased sediment loading and pollution Without appropriate mitigation measures in place, open trench construction activities have the potential to introduce and/or spread INNS which could result in likely significant negative effects on flora and fauna in the receiving environments.		- Watercourses with fisheries potential will be electrofished and fish will be temporarily placed upstream. Pre-commencement white-clawed crayfish survey will be undertaken at open-cut crossings, and if present, individuals will be trapped and translocated (under licence) to upstream of the works - In-stream works will not be carried out in watercourses frequented by salmon or trout during the annual close season and will be undertaken outside of the lamprey spawning season. The timing of works will always be considered on a site-specific basis and in agreement with the IFI - If encountered spawning gravels will be removed at crossing points prior to construction and reinstated after the pipe has been installed (subject to prior agreement with IFI). Gravels will be used to reinstate stream bed. In-stream material will be stored at least 10m from the watercourse - If encountered, lamprey habitat (fine sand/silt) will be removed prior to construction and reinstated after the pipe has been installed (subject to prior agreement with IFI). In-stream material will be stored at least 10m from the watercourse - Once pipes have been placed, they will be pressure tested and hydrostatically tested to eliminate the risk of contaminated water release if a section fails - Watercourse crossings works, including preparatory works will be supervised by an ECoW - After all trenchless crossings are complete the site will be cleaned, and all waste will be disposed of at a licensed facility - Temporary bridging will incorporate silt control fencing to prevent loose material	

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
				spilling from construction vehicles gaining access to the watercourses - Works will be monitored daily by a suitably qualified ECoW to ensure all mitigation is working correctly - After reinstatement, a silt fence will be installed along the riverbank to prevent runoff from the works area entering the stream - Reinstatement works will be monitored/supervised by an ECoW to ensure establishment with remedial works.	
Operational Phase					
Watercourses (FW1, FW2, FW3) ranked as being of 'high ecological value' (Appendix A8.14: Watercourse Crossing Data)	- Habitat degradation associated hydrological impacts resulting from the Washout Valves along the 20m wide Permanent Wayleave - Habitat degradation as a result of pollution and possible leaks.	- Washout Valves along the 20m wide Permanent Wayleave could lead to the removal of old riparian habitat, increased suspended sediment, scouring and destabilisation of the channel beds - Areas requiring permanent headwall for discharging would result in permanent riparian habitat loss - Risk of chemically treated water entering watercourses crossed by the Proposed Project – design requirements include control the discharges from Washout Valves during drain-down events, i.e. use of dechlorination tablets - Leakage or burst on the pipeline which may result in an unplanned discharge.	No	- Releases and discharges from the Washout Valves will be controlled in accordance with EPA and OPW requirements and will be subject to the applicable permitting regime to ensure watercourses have the capacity to receive discharges - The use of an alarm to alert operators of a possible leakage or burst within the pipeline or associated infrastructure - Main infrastructure design will include SuDS and an oil interceptor to store and attenuate runoff generated from the permanent infrastructure sites, or rain water harvesting - Oil and chemical storage tanks and containers will be bunded.	Based on the proposed mitigation measures the Proposed Project would not result in likely significant negative residual effects on these aquatic habitats at any geographic scale.
Watercourses (FW1, FW2, FW4) ranked as being of 'medium ecological value'. (Appendix A8.14: Watercourse Crossing Data)					
Watercourses (FW1, FW2, FW4) ranked as being of 'low ecological value'. (Appendix A8.14: Watercourse Crossing Data)					

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Construction Phase					
White-clawed crayfish	- Habitat loss and habitat degradation - Increased sediment loading or pollution - Introduction and/or spread of INNS.	- The construction of the Proposed Project may cause the pollution of watercourses within the Proposed Project as a result of suspended solids. The introduction of suspended solids can pose negative effects to white-clawed crayfish in the following ways: reduction in visibility, reduction in available food, high concentrations can serve as a sink or carrier for toxins/chemicals, can affect gill structure and can decrease dissolved oxygen levels - The potential effects on this species as a result of trenchless construction are expected to be minimal with no in-stream works required and the locations for drill rig positioning and pipeline pull areas chosen or engineered such that the fall is away from the water body. However, there may be potential for local removal of some riparian vegetation. Where trenchless crossings occur, there is potential for a 'breakout' of bentonite drilling fluid. This is, in effect, a slurry of very fine suspended solids. In practice there is very low probability of this occurring - Potential impacts associated with open trench construction include removal of and disturbance to in-stream and riparian habitats. In addition, construction activities have the potential to introduce or spread INNS, including the crayfish plague which could result in likely significant negative effects on white-clawed crayfish in the receiving environments in the absence of appropriate mitigation measures.	Yes	See above mitigation measures for low and medium-ranked watercourses.	With the implementation of the proposed mitigation measures the Construction Phase of the Proposed Project would not result in a likely significant negative residual effect on this species.
Operational Phase					
White-clawed crayfish	No impacts	There are no activities during the Operational Phase that would impact any white-clawed crayfish.	No	No likely significant negative effects on white-clawed crayfish are predicted during the Operational Phase and no mitigation measures are required.	The Proposed Project would not result in a likely significant negative residual effect on the white-clawed crayfish, at any geographic scale.

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Construction Phase					
Freshwater pearl mussel	- Habitat loss and habitat degradation - Increased sediment loading or pollution - Introduction and/or spread of INNS.	No individuals or suitable habitat were recorded within the Zol of the Proposed Project therefore the Proposed Project would not impact on any populations of freshwater pearl mussel.	No	No likely significant negative effects on freshwater pearl mussel are predicted during the Construction Phase and no mitigation measures are required.	The Proposed Project would not result in a likely significant negative residual effect on freshwater pearl mussel, at any geographic scale.
Operational Phase					
Freshwater pearl mussel	No impacts	There are no activities during the Operational Phase that would impact any freshwater pearl mussel.	No	No likely significant negative effects on freshwater pearl mussel are predicted during the Operational Phase and no mitigation measures are required.	The Proposed Project would not result in a likely significant negative residual effect on the freshwater pearl mussel, at any geographic scale.
Construction Phase					
Atlantic salmon	- Habitat loss and habitat degradation - Increased sediment loading or pollution - Introduction and/or spread of INNS.	- The construction of the Proposed Project may cause the pollution of watercourses within the Proposed Project as a result of suspended solids. The introduction of suspended solids can pose negative effects to Atlantic salmon in the following ways: reduction in visibility, reduction in available food, high concentrations can serve as a sink or carrier for toxins/chemicals, can damage gills, can decrease dissolved oxygen levels and can settle and smother eggs in spawning gravels - The potential effects on this species as a result of trenchless construction are expected to be minimal with no in-stream works required and the locations for drill rig positioning and pipeline pull areas chosen or engineered such that the fall is away from the water body. However, there may be potential for local removal of some riparian vegetation. Where trenchless crossings occur, there is potential for a 'breakout' of bentonite drilling fluid. This is, in effect, a slurry of very fine suspended solids. In practice there is very low probability of this occurring - Potential impacts associated with open trench construction include removal of and disturbance to in-stream and riparian habitats such as spawning gravels.	Yes	See above mitigation measures for low and medium-ranked watercourses.	With the implementation of the proposed mitigation measures the Construction Phase of the Proposed Project would not result in a likely significant negative residual effect on this species.

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Operational Phase					
Atlantic salmon	- Disturbance/ displacement associated with operational noise of water pumps - Mortality or injury associated with the RWI points.	- Noise disturbance is predicted to arise from increased noise levels associated with the pumps within the RWI&PS. Noise level surveys have been carried out and the results were used to assess impacts on aquatic species in Parteen Basin. Based on the measured underwater noise levels already at the site, the noise levels predicted from the water pumps should reach minimum recorded background levels in Parteen Basin within 550m of the water intake when operating at the maximum abstraction rate - The RWI points would be fitted with a PWWC intake screen. This would prevent debris, fish or eels being taken up into the raw water pumps during the Operational Phase. The velocity through the screens would be limited to a level which juvenile fish can swim away.	No	No likely significant negative effects on this species are predicted during the Operational Phase and no mitigation measures are required.	The Proposed Project would not result in a likely significant negative residual effect on Atlantic Salmon, at any geographic scale.
Construction Phase					
Lamprey species	- Habitat loss and habitat degradation - Increased sediment loading or pollution - Introduction and/or spread of INNS.	- The construction of the Proposed Project may cause the pollution of watercourses within the Proposed Project as a result of suspended solids. The introduction of suspended solids can pose negative impacts to lamprey species in the following ways: reduction in visibility, reduction in available food, high concentrations can serve as a sink or carrier for toxins/chemicals and can decrease dissolved oxygen levels - The potential impacts on this species as a result of trenchless construction are expected to be minimal with no in-stream works required and the locations for drill rig positioning and pipeline pull areas chosen or engineered such that the fall is away from the water body. However, there may be potential for local removal of some riparian vegetation. Where trenchless crossings occur, there is potential for a 'breakout' of bentonite drilling fluid. This is, in effect, a slurry of very fine suspended solids. In practice there is very low probability of this occurring - Potential impacts associated with open trench construction include removal of and	Yes	See above mitigation measures for low and medium-ranked watercourses.	With the implementation of the proposed mitigation measures the Construction Phase of the Proposed Project would not result in a likely significant negative residual effect on this species.

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
		disturbance to in-stream and riparian habitats such as spawning gravels and silt beds.			
Operational Phase					
Lamprey species	- Disturbance/displacement associated with operational noise of water pumps - Mortality or injury associated with the RWI points	- Noise disturbance is predicted to arise from increased noise levels associated with the pumps within the RWI&PS. Noise level surveys have been carried out and the results were used to assess impacts on aquatic species in Parteen Basin. Based on the measured underwater noise levels already at the site, the noise levels predicted from the water pumps should reach minimum recorded background levels in Parteen Basin within 550m of the water intake when operating at the maximum abstraction rate - The RWI points would be fitted with a PWWC intake screen. This would prevent debris, fish or eels being taken up into the raw water pumps during the Operational Phase. The velocity through the screens would be limited to a level which juvenile fish can swim away.	No	No likely significant negative effects on lamprey species are predicted during the Operational Phase and no mitigation measures are required.	The Proposed Project would not result in likely significant negative residual effects on lamprey species, at any geographic scale.
Construction Phase					
European eel	- Habitat loss and habitat degradation - Increased sediment loading or pollution - Introduction and/or spread of INNS.	- The construction of the Proposed Project may cause the pollution of watercourses within the Proposed Project as a result of suspended solids. The introduction of suspended solids can pose negative impacts to European eel in the following ways: reduction in visibility, reduction in available food, high concentrations can serve as a sink or carrier for toxins/chemicals and can decrease dissolved oxygen levels - The potential impacts on this species as a result of trenchless construction are expected to be minimal with no in-stream works required and the locations for drill rig positioning and pipeline pull areas chosen or engineered such that the fall is away from the water body. However, there may be potential for local removal of some riparian vegetation. Where trenchless crossings occur, there is potential for a 'breakout' of bentonite drilling fluid. This is, in effect, a slurry of very fine suspended solids. In practice there is very low probability of this occurring	Yes	See above mitigation measures for low and medium-ranked watercourses.	With the implementation of the proposed mitigation measures the Construction Phase of the Proposed Project would not result in a likely significant negative residual effect on this species.

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
		Potential impacts associated with open trench construction include removal of and disturbance to in-stream and riparian habitats such as spawning gravels and silt beds.			
Operational Phase					
European eel	- Disturbance/displacement associated with operational noise of water pumps - Mortality or injury associated with the RWI points	- Noise disturbance is predicted to arise from increased noise levels associated with the pumps within the RWI&PS. Noise level surveys have been carried out and the results were used to assess impacts on aquatic species in Parteen Basin. Based on the measured underwater noise levels already at the site, the noise levels predicted from the water pumps should reach minimum recorded background levels in Parteen Basin within 550m of the water intake when operating at the maximum abstraction rate - The RWI points would be fitted with a PWWC intake screen. This would prevent debris, fish or eels being taken up into the raw water pumps during the Operational Phase. The velocity through the screens would be limited to a level which juvenile fish can swim away.	No	No likely significant negative effects on European eel are predicted during the Operational Phase and no mitigation measures are required.	The Proposed Project would not result in likely significant negative residual effects on European eel, at any geographic scale.
Construction Phase					
Other fish species	- Habitat loss and habitat degradation - Increased sediment loading or pollution - Introduction and/or spread of INNS.	- The construction of the Proposed Project may cause the pollution of watercourses within the Proposed Project as a result of suspended solids. The introduction of suspended solids can pose negative impacts to fish species in the following ways: reduction in visibility, reduction in available food, high concentrations can serve as a sink or carrier for toxins/chemicals and can decrease dissolved oxygen levels - The potential impacts on this species as a result of trenchless construction are expected to be minimal with no in-stream works required and the locations for drill rig positioning and pipeline pull areas chosen or engineered such that the fall is away from the water body. However, there may be potential for local removal of some riparian vegetation. Where trenchless crossings occur, there is potential for a 'breakout' of bentonite drilling	Yes	See above mitigation measures for low and medium-ranked watercourses.	With the implementation of the proposed mitigation measures the Construction Phase of the Proposed Project would not result in a likely significant negative residual effect on other fish species.

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
		fluid. This is, in effect, a slurry of very fine suspended solids. In practice there is very low probability of this occurring Potential impacts associated with open trench construction include removal of and disturbance to in-stream and riparian habitats such as spawning gravels and silt beds.			
Operational Phase					
Other fish species	- Disturbance/displacement associated with operational noise of water pumps - Mortality or injury associated with the RWI points	- Noise disturbance is predicted to arise from increased noise levels associated with the pumps within the RWI&PS. Noise level surveys have been carried out and the results were used to assess impacts on aquatic species in Parteen Basin. Based on the measured underwater noise levels already at the site, the noise levels predicted from the water pumps should reach minimum recorded background levels in Parteen Basin within 550m of the water intake when operating at the maximum abstraction rate - The RWI points would be fitted with a PWWC intake screen. This would prevent debris, fish or eels being taken up into the raw water pumps during the Operational Phase. The velocity through the screens would be limited to a level which juvenile fish can swim away.	No	No likely significant negative effects on other fish species are predicted during the Operational Phase and no mitigation measures are required.	The Proposed Project would not result in likely significant negative residual effects on other fish species, at any geographic scale.

8.11.4 Ornithology – Breeding Birds

8.11.4.1 Residual Effects in Construction Phase

1152. Mitigation measures will be implemented and monitored during the Construction Phase which would minimise the mortality risk, and the effects of habitat loss and disturbance on breeding birds. This includes seasonal vegetation clearance and surveys conducted by an ECoW. Therefore, the Proposed Project will not result in a likely significant negative residual effect on breeding birds, at any geographic scale.

8.11.4.2 Residual Effects in Operational Phase

1153. There are no likely significant effects predicted for bird species during the Operational Phase of the Proposed Project, with the exception of barn owl. A nest box will be erected to mitigate for the permanent loss of a nest site and monitoring will be carried out by a suitably qualified ECoW/ornithologist. With the implementation of this mitigation, the Proposed Project will not result in a likely significant negative residual effect on breeding birds, at any geographic scale.

8.11.4.3 Summary of Residual Effects Upon Breeding Birds

Table 8.107: Residual Effects Upon Breeding Birds (Key Species of Conservation Significance)

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Parteen Basin, RWI&PS and the Route of the Treated Water Pipeline					
Construction Phase					
Barn owl	Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss or fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons	Habitat loss and fragmentation: Permanent, Moderate negative effects Habitat degradation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Slight negative effects	Yes	A replacement barn owl nest box will be installed within the townland Ballyhugh or Springfield, County Offaly, in a suitable and secure location, the installation of which will be overseen by the qualified ECoW. The site will be selected for optimal habitat and low disturbance risk, and its effectiveness will be monitored annually for five years to assess occupancy and breeding success	Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation and disturbance and displacement. Therefore, the Proposed Project would not result in a likely significant negative residual effect on barn owl, at any geographic scale.
Black-headed gull	- Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance - The construction of the Proposed Project could potentially have a negative impact, resulting in a reduction in water quality which could have an indirect impact on water birds. Potential impacts include pollution from the build-up of silt, oil and/or chemical spillage as a result of construction activities in or near watercourses. Furthermore, there is potential for a 'breakout' of bentonite drilling fluid during trenchless water crossings and increases to sediment load as a result of open-cut crossing techniques.	Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Significant negative effects Disturbance/displacement: Short-term, Slight negative effects	Yes	Vegetation clearance will generally be avoided between March 1 and August 31	Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction of water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on black-headed gulls, at any geographic scale.
Coot		Habitat loss and fragmentation: Permanent, Not Significant negative effects Habitat degradation: Short-term, Significant negative effects Disturbance/displacement: Permanent, Slight negative effects	Yes	- Where this seasonal restriction cannot be observed, the area will be inspected by an ECoW prior to clearance - Buffer zones to be used around nests that are occupied up until the chicks have fledged. An exclusion zone will be	Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation and displacement, and reduction of water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on coot at any geographic scale.

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Curlew	As above	Habitat loss and fragmentation: Short-term, Slight negative effects	No	dependent on the species present	There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on curlew at any geographic scale.
		Habitat degradation: Short-term, Slight negative effects		Areas with no nests recorded will be cleared within three days and vegetation will be chipped, removed, or covered within the same day to prevent birds nesting	
		Disturbance/displacement: Short-term, Slight negative effects	Yes	Seasonal restrictions will be implemented for important bird areas where concentrations of breeding and or wintering birds congregate. Where it is not possible to avoid works, pre-works inspections will be undertaken by an ECoW and buffer zones will be established	Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction of water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on great crested grebe, at any geographic scale.
Great crested grebe		Habitat loss and fragmentation: Short-term, Slight negative effects		To mitigate against the reduction of water quality, causing the degradation of habitat for bird species, mitigations outlined within Section 8.8.3 are applicable to these KERs.	
		Habitat degradation: Short-term, Significant negative effects	Yes		Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction of water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on grey wagtail, at any geographic scale.
Grey wagtail		Disturbance/displacement: Short-term, Slight negative effects			
		Habitat loss and fragmentation: Short-term, Slight negative effects	No		There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on hen harrier at any geographic scale.
Hen harrier		Habitat degradation: Short-term, Not Significant negative effects			
		Disturbance/displacement: Short-term, Slight negative effects			

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Kestrel	As above	Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Slight negative effects	No	As above	There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on kestrel at any geographic scale.
Kingfisher		Habitat loss and fragmentation: Short-term, Moderate negative effects Habitat degradation: Short-term, Moderate negative effects Disturbance/displacement: Short-term, Moderate negative effects	Yes		Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement. Therefore, the Proposed Project would not result in a likely significant negative residual effect on kingfisher at any geographic scale.
Lapwing		Habitat loss and fragmentation: Short-term, Moderate negative effects Habitat degradation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Moderate negative effects	Yes		Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction of water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on lapwing at any geographic scale.

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Mallard	As above	Habitat loss and fragmentation: Short-term, Not Significant negative effects	No	As above	There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on mallard at any geographic scale.
Meadow pipit		Habitat degradation: Short-term, Slight negative effects			
		Disturbance/displacement: Short-term, Not Significant negative effects			
	As above	Habitat loss and fragmentation: Short-term, Moderate negative effects	Yes	As above	Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation and disturbance and displacement. Therefore, the Proposed Project would not result in a likely significant negative effect on meadow pipit at any geographic scale.
		Habitat degradation: Short-term, Imperceptible negative effects			
		Disturbance/displacement: Short-term, Moderate negative effects			
Mute swan	As above	Habitat loss and fragmentation: Permanent, Not Significant negative effects	Yes	As above	Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction of water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on mute swan at any geographic scale.
		Habitat degradation: Short-term, Significant negative effects			
		Disturbance/displacement: Permanent, Slight negative effects			

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Peregrine falcon	As above	Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Slight negative effects	No	As above	There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on peregrine falcon at any geographic scale.
Ringed plover		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Slight negative effects	No		There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on ringed plover at any geographic scale.
Sand martin		Habitat loss and fragmentation: Permanent, Not Significant negative effects Habitat degradation: Short-term, Not Significant negative effects Disturbance/displacement: Permanent, Not Significant negative effects	No		There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on sand martin at any geographic scale.

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Snipe	As above	Habitat loss and fragmentation: Short-term, Moderate negative effects	Yes	As above	Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction of water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on snipe at any geographic scale.
		Habitat degradation: Short-term, Slight negative effects			
		Disturbance/displacement: Short-term, Moderate negative effects			
Woodcock		Habitat loss and fragmentation: Short-term, Slight negative effects	No		There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on woodcock at any geographic scale.
	Habitat degradation: Short-term, Imperceptible negative effects				
	Disturbance/displacement: Short-term, Slight negative effects				
Yellowhammer		Habitat loss and fragmentation: Short-term, Moderate negative effects	Yes		Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation and disturbance and displacement. Therefore, the Proposed Project would not result in a likely significant negative residual effect on yellowhammer at any geographic scale.
		Habitat degradation: Short-term, Imperceptible negative effects			
		Disturbance/displacement: Short-term, Moderate negative effects			
Other Species of Low Conservation Significance (as listed in Table 8.44)		Habitat loss and fragmentation: Short-term, Slight to Imperceptible negative effects	No		There are no potential significant negative effects on these species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on these species at any geographic scale.
		Habitat degradation: Short-term, Slight to Imperceptible negative effects			
		Disturbance/displacement: Short-term, Slight to Imperceptible negative effects			

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
38 kV Uprate Works					
Black-headed gull	- Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons - Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance - The construction of the Proposed Project could potentially have a negative impact, resulting in a reduction in water quality which could have an indirect impact on water birds. Potential impacts include pollution from the build-up of silt, oil and/or chemical spillage as a result of construction activities in or near watercourses. Furthermore, there is potential for a 'breakout' of bentonite drilling fluid during trenchless water crossings and increases to sediment load as a result of open-cut crossing techniques.	Habitat loss and fragmentation: Short-term, Slight negative effects	Yes	As above	Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction of water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on black-headed gulls, at any geographic scale.
Common gull		Disturbance/displacement: Short-term, Significant negative effects	No		There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on common gull at any geographic scale.
Coot		Habitat loss and fragmentation: Short-term, Not Significant negative effects			
Cormorant		Disturbance/displacement: Short-term, Slight negative effects	Yes		Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation and disturbance and displacement. Therefore, the Proposed Project would not result in a likely significant negative residual effect on cormorant at any geographic scale.
Curlew		Habitat loss and fragmentation: Short-term, Slight negative effect			
	Disturbance/displacement: Short-term, Significant negative effects				
		Habitat loss and fragmentation: Short-term, Slight negative effects			There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on curlew at any geographic scale.
		Disturbance/displacement: Short-term, Slight negative effects			

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Grey wagtail	As above	Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Slight negative effects	No	As above	There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on grey wagtail at any geographic scale.
Herring gull		Habitat loss and fragmentation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Slight negative effects	No		There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on herring gull at any geographic scale.
Kestrel		Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Slight negative effects	No		There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on kestrel at any geographic scale.
Kingfisher		Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Moderate negative effects	Yes		Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation and disturbance and displacement. Therefore, the Proposed Project would not result in a likely significant negative residual effect on kingfisher at any geographic scale.
Lapwing		Habitat loss and fragmentation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Slight negative effects	No		There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on lapwing at any geographic scale.
Lesser black-backed gull		Habitat loss and fragmentation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Slight negative effects	No		There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on lesser black-backed gull at any geographic scale.

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Mallard	As above	Habitat loss and fragmentation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Not Significant negative effects	No	As above	There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on mallard at any geographic scale.
Meadow pipit		Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Slight negative effects	No		There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on meadow pipit at any geographic scale.
Mute swan		Habitat loss and fragmentation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Not Significant negative effects	No		There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on mute swan at any geographic scale.
Redshank		Habitat loss and fragmentation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Slight negative effects	No		There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on redshank at any geographic scale.
Snipe		Habitat loss and fragmentation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Moderate negative effects	Yes		Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction on water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on snipe at any geographic scale.

Key Ecological Receptor	Potential Impact(s)	Assessment of Potential Impact	Potential Significant Effect	Mitigation	Residual Effect
Other Species of Low Conservation Significance (as listed in Table 8.46)	As above	Habitat loss and fragmentation: Short-term, Slight to Imperceptible negative effects Disturbance/displacement: Short-term, Slight to Imperceptible negative effects	No	As above	There are no potential significant negative effects on these species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on these species at any geographic scale.

8.11.5 Ornithology – Wintering Birds

8.11.5.1 Residual Effects in Construction Phase

1154. Mitigation measures will be implemented and monitored during the Construction Phase which would minimise the mortality risk, and the effects of habitat loss and disturbance on wintering birds. This includes phased construction work, seasonal restrictions in important bird areas and surveys conducted by an ECoW. Furthermore, while displacement in the winter months (October to March) is possible due to construction works at the RWI&PS, there is sufficient alternative suitable habitat in Parteen Basin and Lough Derg, beyond the Zol. Therefore, the Proposed Project would not result in a likely significant negative residual effect on wintering birds, at any geographic scale.

8.11.5.2 Residual Effects in Operational Phase

1155. There are no likely significant effects predicted for any bird species during the Operational Phase of the Proposed Project. Therefore, the Proposed Project would not result in a likely significant negative residual effect on wintering birds, at any geographic scale.

8.11.5.3 Summary of Residual Effects Upon Wintering Birds

Table 8.108: Residual Effects Upon Wintering Birds (Key Species of Conservation Significance)

Key Ecological Receptor	Potential Impacts	Assessment of Potential Impacts	Potential Significant Effect	Mitigation	Residual Effects
Parteen Basin, RWI&PS and the Route of the Treated Water Pipeline					
Construction Phase					
Black-headed gull	Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons	Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Significant negative effects Disturbance/displacement: Short-term, Slight negative effects	Yes	- Phased construction work to be implemented to allow seasonal vegetation removal - Important bird areas will be identified where concentrations on breeding and wintering waders have been recorded	Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction on water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on black-headed gull, at any geographic scale.
Coot	- Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance - The construction of the Proposed Project could potentially have a negative impact, resulting in a reduction in water quality which could have an indirect impact on water birds. Potential impacts include pollution from the build-up of silt, oil and/or chemical spillage as a result of construction activities in or near watercourses. Furthermore, there is potential for a 'breakout' of bentonite drilling fluid during trenchless water crossings and increases to sediment load as a result of open-cut crossing techniques.	Habitat loss and fragmentation: Short-term, Not Significant effects Habitat degradation: Short-term, Significant negative effects Disturbance and/or displacement: Short-term, Slight negative effects	Yes	Areas where wintering waders are known to concentrate will be avoided during the winter months.	Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction on water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on coot, at any geographic scale.
Cormorant		Habitat loss and fragmentation: Short-term, Slight negative effects Habitat degradation: Short-term, Significant negative effects Disturbance/displacement: Short-term, Moderate negative effects	Yes	To mitigate against the reduction of water quality causing the degradation of habitat for bird species, mitigations outlined within Section 8.8.3 are applicable to these KERs.	Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction on water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on cormorant at any geographic scale.

Key Ecological Receptor	Potential Impacts	Assessment of Potential Impacts	Potential Significant Effect	Mitigation	Residual Effects
Curlew	As above	Habitat loss and fragmentation: Short-term, Slight negative effects	No	As above	There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on curlew at any geographic scale.
		Habitat degradation: Short-term, Slight negative effects			
		Disturbance/displacement: Short-term, Slight negative effects			
Gadwall		Habitat loss and fragmentation: Short-term, Not Significant effects	No		There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on gadwall at any geographic scale.
		Habitat degradation: Short-term, Slight negative effects			
		Disturbance/displacement: Short-term, Not Significant effects			
Golden plover		Habitat loss and fragmentation: Short-term, Slight negative effects	No		There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on golden plover at any geographic scale.
		Habitat degradation: Short-term, Slight negative effects			
	Disturbance/displacement: Short-term, Slight negative effects				
Great crested grebe	Habitat loss and fragmentation: Short-term, Slight negative effects	Yes	Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction on water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on great crested grebe, at any geographic scale.		
	Habitat degradation: Short-term, Significant negative effects				
	Disturbance/displacement: Short-term, Slight negative effects				

Key Ecological Receptor	Potential Impacts	Assessment of Potential Impacts	Potential Significant Effect	Mitigation	Residual Effects		
Goldeneye	As above	Habitat loss and fragmentation: Short-term, Slight negative effects	Yes	As above	Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction on water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on goldeneye, at any geographic scale.		
Hen harrier		Habitat degradation: Short-term, Significant negative effects			No	There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on hen harrier, at any geographic scale.	
		Disturbance/displacement: Short-term, Moderate negative effects					
		Habitat loss and fragmentation: Short-term, Slight negative effects	No				There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on herring gull, at any geographic scale.
Herring gull	Habitat degradation: Short-term, Not Significant negative effects	No		There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on herring gull, at any geographic scale.			
	Disturbance/displacement: Short-term, Slight negative effects						
Lapwing		Habitat loss and fragmentation: Short-term, Not Significant effects	No	As above	There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on herring gull, at any geographic scale.		
		Habitat degradation: Short-term, Slight negative effects				No	There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on herring gull, at any geographic scale.
		Disturbance/displacement: Short-term, Not Significant effects					
		Habitat loss and fragmentation: Short-term, Moderate negative effects	Yes	As above	Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction on water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on lapwing at any geographic scale.		
		Habitat degradation: Short-term, Slight negative effects					
		Disturbance/displacement: Short-term, Moderate negative effects					

Key Ecological Receptor	Potential Impacts	Assessment of Potential Impacts	Potential Significant Effect	Mitigation	Residual Effects
Lesser black-backed gull	As above	Habitat loss and fragmentation: Short-term, Not Significant effects	No	As above	There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on lesser black-backed gull at any geographic scale.
		Habitat degradation: Short-term, Slight negative effects			
		Disturbance/displacement: Short-term, Not Significant effects			
Mallard		Habitat loss and fragmentation: Short-term, Not Significant effects	No		There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on mallard at any geographic scale.
	Habitat loss and fragmentation: Short-term, Slight negative effects				
	Disturbance/displacement: Short-term, Not Significant effects				
Mute swan		Habitat loss and fragmentation: Short-term, Slight negative effects	Yes		Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction on water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on mute swan at any geographic scale.
		Habitat degradation: Short-term, Significant negative effects			
		Disturbance/displacement: Short-term, Moderate negative effects			
Pochard		Habitat loss and fragmentation: Short-term, Slight negative effects	Yes		Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction on water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on pochard at any geographic scale.
		Habitat degradation: Short-term, Moderate negative effects			
		Disturbance/displacement: Short-term, Slight negative effects			

Key Ecological Receptor	Potential Impacts	Assessment of Potential Impacts	Potential Significant Effect	Mitigation	Residual Effects	
Redshank	As above	Habitat loss and fragmentation: Short-term, Slight negative effects	No	As above	There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on redshank at any geographic scale.	
Shoveler		Habitat degradation: Short-term, Slight negative effects			Yes	Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction on water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on shoveler at any geographic scale.
Snipe		Disturbance/displacement: Short-term, Slight negative effects				Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction on water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on snipe at any geographic scale.
Teal		Habitat loss and fragmentation: Short-term, Not Significant effects	No		There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on teal at any geographic scale.	
	Habitat degradation: Short-term, Slight negative effects					
	Disturbance/displacement: Short-term, Not Significant effects					

Key Ecological Receptor	Potential Impacts	Assessment of Potential Impacts	Potential Significant Effect	Mitigation	Residual Effects	
Tufted duck	As above	Habitat loss and fragmentation: Short-term, Slight negative effects	Yes	As above	Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction on water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on tufted duck at any geographic scale.	
Whooper swan		Habitat degradation: Short-term, Significant negative effects			Mitigation measures (as outlined) will be implemented to minimise the loss of habitat and fragmentation, disturbance and displacement, and reduction on water quality. Therefore, the Proposed Project would not result in a likely significant negative residual effect on whooper swan at any geographic scale.	
Wigeon		Disturbance/displacement: Short-term, Moderate negative effects	Yes		No	There are no potential significant negative effects on this species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on wigeon at any geographic scale.
Other Species of Low Conservation Significance (as listed in Table 8.48 and Table 8.50)		Habitat loss and fragmentation: Short-term, Imperceptible effects				Habitat degradation: Short-term, Slight to imperceptible negative effects
		Disturbance/displacement: Short-term, Not Significant effects	No			
		Habitat degradation: Short-term, Slight negative effects	No			
		Disturbance/displacement: Short-term, Not Significant effects				
		Habitat loss and fragmentation: Short-term, Imperceptible effects	No			
		Habitat degradation: Short-term, Slight to imperceptible negative effects				
		Disturbance/displacement: Short-term, Imperceptible effects				

Key Ecological Receptor	Potential Impacts	Assessment of Potential Impacts	Potential Significant Effect	Mitigation	Residual Effects
38 kV Uprate Works					
Common sandpiper	- Construction of the Proposed Project would result in temporary and permanent habitat loss which would reduce the availability of local habitat for birds. The duration of habitat loss/fragmentation along the Proposed Project is expected to last for approximately one to two breeding seasons - Habitat loss through species disturbance/displacement as a result of construction activities such as movement of machinery and associated noise and disturbance.	Habitat loss and fragmentation: Short-term, Not Significant negative effects	No	NA	There are no potential significant negative effects on these species predicted during the Construction Phase. Therefore, the Proposed Project would not result in a likely significant negative residual effect on these species at any geographic scale.
Cormorant		Habitat loss and fragmentation: Short-term, Slight negative effects	No		
Curlew		Habitat loss and fragmentation: Short-term, Not Significant negative effects	No		
Goldeneye		Habitat loss and fragmentation: Short-term, Slight negative effects	No		
Goosander		Habitat loss and fragmentation: Short-term, Not Significant negative effects	No		
Great crested grebe		Habitat loss and fragmentation: Short-term, Not Significant negative effects	No		

Key Ecological Receptor	Potential Impacts	Assessment of Potential Impacts	Potential Significant Effect	Mitigation	Residual Effects
Green sandpiper	As above	Habitat loss and fragmentation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No	NA	As above
Greylag goose		Habitat loss and fragmentation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Not Significant negative effects	No		
Lapwing		Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No		
Little grebe		Habitat loss and fragmentation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No		
Mallard		Habitat loss and fragmentation: Short-term, Not Significant negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No		
Moorhen		Habitat loss and fragmentation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Slight negative effects	No		

Key Ecological Receptor	Potential Impacts	Assessment of Potential Impacts	Potential Significant Effect	Mitigation	Residual Effects
Mute swan	As above	Habitat loss and fragmentation: Short-term, Slight negative effects	No	NA	As above
Pochard		Disturbance/displacement: Short-term, Slight negative effects	No		
Redshank		Habitat loss and fragmentation: Short-term, Imperceptible negative effects	No		
Scaup		Disturbance/displacement: Short-term, Imperceptible negative effects	No		
Snipe		Habitat loss and fragmentation: Short-term, Slight negative effects	No		
Teal		Disturbance/displacement: Short-term, Imperceptible negative effects	No		

Key Ecological Receptor	Potential Impacts	Assessment of Potential Impacts	Potential Significant Effect	Mitigation	Residual Effects
Tufted duck	As above	Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Slight negative effects	No	NA	As above
Whooper swan		Habitat loss and fragmentation: Short-term, Slight negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No		
Wigeon		Habitat loss and fragmentation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No		
Other Species of Low Conservation Significance (as listed in Section 8.3.5.2.3)		Habitat loss and fragmentation: Short-term, Imperceptible negative effects Disturbance/displacement: Short-term, Imperceptible negative effects	No		

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